The Builder.

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Royal Academy Studentship Sketches.....By Mr. J. B. Fulton
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The Church of Watford.

THE ancient market-town of Watford, fifteen miles north of London, formed part of the large gift of King Offa to the Abbey of St. Albans, and in the Conqueror's time was held by that Abbot. The parish church was of old appropriated to the Abbey, and the vicars were appointed by the Abbot and convent down to the time of their suppression.

About the middle of the XIIth century the abbey assigned the tithes of the manor of Cashio and two-thirds of the tithes of the whole parish of Watford to the newly-founded Benedictine nunnery at Mergate, Bedfordshire. From the Taxation Roll of 1291 it is seen that the nuns of Mergate at that time had an income of 12*l.* out of the church of Watford, whilst the refectorian of the Abbey of St. Albans drew 8*l.* 13s. 4d. from the like source. The vicarage, when first ordained, was exceptionally well endowed, but the same official of the abbey at that time claimed the large pension of 8*l.* out of the vicarage, leaving to the actual vicar of Watford the small salary of 4*l.* 13s. 4d. The *valor*, however, of the time of Henry VIII. shows that the vicarage was then worth 21*l.* 12s. a year.

The church, which is dedicated to St. Mary, stands at the upper end of the town, on the south-west side of the main street. It consists of a chancel with north and south chapels; a clear-storied nave of six bays, with north and south aisles widened at the east ends into quasi-transepts; north and south porches; and a fine western tower, with the aisles continued on each side of it.

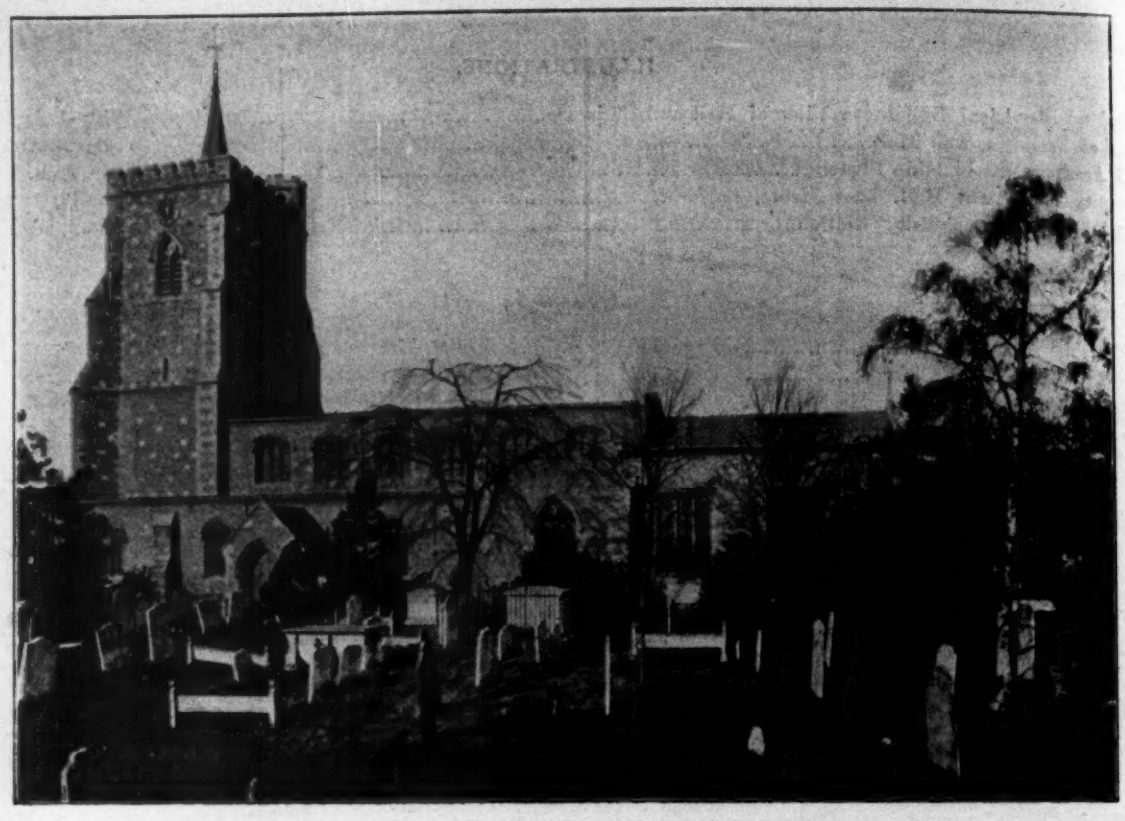
The various historians of Hertfordshire are decidedly curt in their notices of this fabric, contenting themselves with details as to its many important endowments of comparative late date. Modern guide-book writers confine themselves for the most part to calling the church "a spacious edifice." Nevertheless, this much-restored fabric has decided interest pertaining to it, apart from the monuments.

Sir Henry Chauncy, the first historian of the county, wrote, in 1700:—"This Church is scituated near the middle of the Town, and contains three large Isles, with a fair Chancel at the East end, and two Chappels on either side of the Chancel, whereof the largest was built by Sir Charles Morisin, where the Lords of Caishoberry are interred: The Church, Chancel, and Chappels are covered with Lead; at the West end of the Church adjoyns a square Tower, in which hang a Ring of six Bells, with a short Shaft or Spire erected thereupon."

We may be quite sure that this old town had a church in the later Saxon days; but of that there is no trace, though it may safely be assumed that it stood on this site. When the church underwent a very considerable "restoration," involving not a little rebuilding, in the year 1871, a large number of wrought and moulded stones of the early Norman style came to light, proving that a substantial stone church had been here erected soon after the Conquest. Some of these can still be detected in various parts of the building, particularly in the tower. In the inner wall of the north aisle, close to the doorway, is a small recess with a plainly-moulded semi-circular head. Possibly this may be the niche over a holy-water stoup of Norman date; but this is only a surmise, for we cannot be sure that it is in its original position.

There is an obvious remnant in the present fabric of early English work of the time of Henry III. This is to be found in the east respond of the south arcade of the nave, against the walling between the arches into the chancel and St. Katharine's chapel. The respond is of three grouped shafts; the base-mouldings prove beyond doubt that there was an arcade here of early English design. Several XIIIth as well as XIVth century carved and moulded stones were brought to light in 1871. Some of the best of these, including examples of bold dog-tooth ornament, may be seen in the priest's vestry at the west end of the north aisle.

All the main features of this church, both interior and exterior, are obviously of XVth or early XVIth century date. The quasi-transept enlargements of the nave aisles at their east ends seem, however, to speak of a time, probably in the XIIIth century, when the church had a true cruciform plan. The nave is divided from the aisles by arcades of



Watford Church.

six arches on each side, supported by octagon pillars with plainly-moulded XVth century capitals and bases; but the terminals of the hood-moulds of the arches at each end of the south arcade retain XIIIth century characteristics. The clearstory has six large three-light windows on each side. The western tower is a substantially built, well-buttressed erection in four stages, with an embattled parapet. Including the very short octagon leaded spire, which rises from the centre, the height somewhat exceeds 100 ft. There is a newel stair turret in the north-east angle, rising above the rest of the battlements. In the bell-chamber swing eight bells, the tenor weighing 22 cwt. At the base of the tower are various old wooden tablets recording the achievements of the ringers of this celebrated peal of bells. The low-roofed nave aisles are continued each side of the tower, forming convenient vestries.

On the south side of the chancel is an aisle or chapel (now used as an organ chamber) dedicated to St. Katharine, and usually known as the Heydon chapel. Chauncy mentions a memorial in this place to John Heydon of the Grove, who died in 1400. Another memorial mentioned by Chauncy, Newcourt, Clutterbuck, and other later writers stated that this "south Isle" or chapel was built by William Haydon, of New-street, Watford, and by Joan his mother. Joan died in 1505, and William in 1515. It was probably a rebuilding of an older chapel. It is separated from the chancel by a double arcade, supported by a lofty, somewhat slender octagon pillar and responds. In the south wall of the chancel, close to the east end, is a large double piscina — double piscinas are usually *temp.* Edward I.

To the north wall of the chancel, two old monumental brasses have been affixed; an inscription states that they were moved here from the centre of the chancel floor for their better preservation in 1871, when the floor was relaid. The old inscription plates are lacking, but we know from Weever's "Ancient Funerall Monuments" (1631) that they commemorated Sir Hugh Holes, Justice of the King's Bench, who died in 1415, and his wife Margaret, who died in the following year. Above the brasses is a mural tablet to various members of the family of Ewer, erected in 1667.

The large north chapel of the chancel, usually termed the Essex chapel, is of Elizabethan date, and contains a most remarkable and important display of monumental statuary and other memorials, which can here be only briefly epitomised.

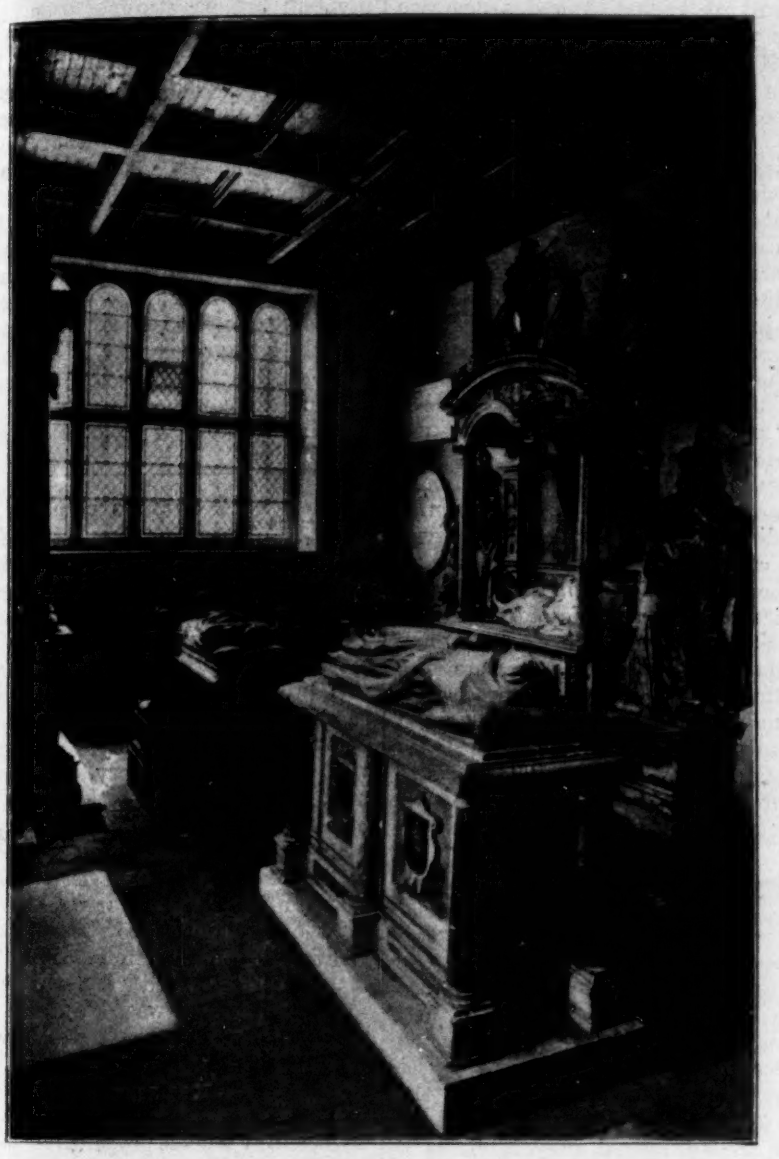
This chapel was built in 1595, on the site of a previous one then used as a vestry, by Lady Bridget Countess of Bedford, formerly the wife of Sir Richard Morrison. The Morrisons were lords of Cashiobury, and patrons of the vicarage of Watford after the dissolution of the monasteries. The monument of the founder is in the centre of the east end of the chapel. The recumbent effigy of the Countess is on a lofty table-tomb of alabaster. The ermine-lined mantle is thrown back, showing a loose-fitting gown. On the head is a kind of 'kerchief headdress, surmounted by a coronet, and the feet rest on a dog. The inscription at the east end of the tomb indulges in unlimited eulogy, concluding with describing her as "one of the noblist matrons of England for her wisdom and judgement." She was a daughter of John Lord Hussey, and married (1) Sir Richard Morrison, (2) Henry Earl of Rutland, and (3) Francis Russell Earl of Bedford. Her only issue was a son and two daughters by her first husband. She died on January 12, 1600–1.

On the north and south sides of the tomb and at the west end are the various armorial bearings of her three marriages.

West of this monument stands another table-tomb, bearing on the cover, which is supported by six marble shafts, the effigy of a lady similarly clad to the Countess in most respects, but showing, after an interesting fashion, the change that came about in costume in the period of eleven years. The ruff, for instance, of the last effigy gives way to a high standing collar rising up at the back of the head. This is the tomb, as described in a long and plaintive epitaph, of Dame Elizabeth Russell, wife of Sir William Russell, one of the sons of Francis Earl of Bedford; she died in 1611.

Against the south side of the chapel at the east end (the easternmost of the two archways into the chapel has been filled up) is the striking monument—splendid of its kind—of Sir Charles Morrison, the only son of Lady Bridget; it has classical pillars supporting a canopy surmounted by a pediment, beneath which is the mailed figure of the knight, but without either helmet or gauntlets, reclining on the left elbow. At the east end of the monument is the kneeling figure of his son Charles, and at the west end the kneeling figure of his other surviving child, Bridget, wife of Robert Earl of Sussex. Both these subsidiary figures are under marble canopies of drapery. Sir Charles predeceased his mother the countess, for he died in 1599, at the age of 51.

This remarkable monument was the work of Nicholas Stone, an English sculptor of repute. Walpole, in his "Anecdotes of Painting," notes from this artist's memoranda:—"1619. A bargain was made with Sir Charles Morrison, of Cashiobury, in Hartfordshire, for a tomb of alabaster and touchstone only; one pictor of white marble for his father,



The Essex Chapel, Watford Church.

and his own, and his sister the Countess of Sesex, as great as the life; for the which I had well payed £260, and four pieces given me to drink."

On the north side of the chapel is another large and stately marble monument to Sir Charles Morrison the younger and his wife. The knight is in a reclining attitude in armour, with his right hand on a skull; his wife is on a lower level, her head resting on two cushions. Over them is a large double canopy. At the head of the monument is a projecting pedestal, on which is the kneeling figure of Elizabeth, his daughter, wife of Lord Capell, who is said to have been treacherously put to death by the Parliament forces after he had surrendered. Another pedestal, at the east end, supports two infant sons. Sir Charles died in 1628. This tomb was also the work of Nicholas Stone, who covenanted with Sir Charles's widow to erect it for 400*l*. The detailed agreement is set forth at length in Clutterbuck's "History of Hertfordshire" (1815).

This chapel abounds in later monuments, particularly of Earls and Countesses of Essex, but the only other one that can here be noted is a remarkable brass on the floor bearing the effigies of three servants of the Morrison family, who died 1610—1613. Beneath the figures is the following inscription:—"Here lyeth buried the bodies of Henry Dickson, George Miller, and Anthony Cooper, who were late servants to S^{r} Charles Morrison knight deceased, and after contynewed in service with Dorothie La: Morrison his wife, and S^{r} Charles Morrison knight and barronett their sonne, by the space of 40 years. In memory of them the sayd Dorothie La: Morrison hath vouchsafed this stone and inscription."

There is no other memorial chapel in England containing such a remarkable collection of excellent monuments of the opening years of the XVIIth century. The collection is invaluable as a study of the art and costume of those days.

Under the tower stands a well-carved early Jacobean chest. There is another smaller Jacobean chest in the Essex chapel, and two more in the priest's vestry on the north side of the tower. In this vestry there is a very fine *armorium*, or vestment cupboard. It is a good piece of Renaissance carving, with a handsome cornice and carvings of the four Evangelists on the panelled doors. It was a recent gift to the church by the venerable vicar, the Rev. R. L. James, who has this year celebrated the jubilee of his tenure of this benefice.

In the opposite choristers' vestry may be noticed a mural tablet of white marble to Robert Clutterbuck, F.S.A., the historian of the county, who died in 1831. Here, too, is a fine painting on canvas of the royal arms, bearing the date of 1736.

In 1848 the interior of the church underwent a much-needed restoration, or rather refurnishing. The square box-pews and galleries were cleared away. In removing the galleries some paintings were discovered on two of the pillars of the north arcade of the nave. The then vicar, Rev. H. F. Woolynch, in a communication to the British Archæological Association, vaguely described the most important painting as "a classical personage of large dimensions." They were in poor condition, and considered impossible to preserve. The subjects were considered to be representations of St. Christopher and St. Dunstan. The arrangements of this church prior to 1848 must have been peculiar, for Clutterbuck (1815) states that:—"The *east* end of the nave is terminated by a handsome gallery built with oak, and supported by pillars of the same material, which was erected in the year 1766. In the centre of this gallery there is an organ, on each side of which range seats, appropriated to the use of the children belonging to Mrs. Fuller's charity school."

In 1871 the whole of the exterior of the church underwent a searching restoration, which would probably have been less vigorous if undertaken at a later date. Almost all the window casings and tracery were renewed, and all the walls on the south side were taken down and rebuilt, save a small piece at the west end of the south transept. The shallow south porch was at the same time added. Unfortunately the squared stones of the terminals of the new hood-moulds over the windows on this side of the church still remain unsculptured. All the outer walls were re-dressed; they are of flint with freestone dressings. The insertion of squared pieces of Bath stone at intervals produces a somewhat unhappy, spotty effect, particularly in the tower. Thin pieces of roofing tiles are introduced fitfully; whilst the edges of much thicker squared tiles show in some places, and appear to be of Roman date.

Among various interior changes made in 1871 was the introduction of a large and elaborate font of Caen stone and marble, which stands beneath the tower, the west doorway being the principal entrance. This font possesses a handsome tabernacled cover suspended by pulleys. At the time of our visit it was raised some 3 ft. above the font, and we were told that that is its usual position. We have noticed the same eccentricity with font covers in other churches, as at St. Sepulchre's, Northampton. This is an absurd "use" for which there is no manner of justification. A font cover is meant to cover, to exclude dust and check irreverent use. Far better to discard a cover than to keep it thus ridiculously suspended in mid air, as though it was some kind of preposterous lamp.

There are various references to the church of Watford among the chronicles and annals of the great abbey of St. Albans, but these entries refer for the

most part to such matters as disputes as to appointments of particular vicars, and are, therefore, not pertinent to an essay on the fabric. One, however, of these references may be cited, as it relates to the church itself. In October, 1467, Abbot William Albon proceeded to Watford for performing the ceremony of "reconciling" the parish church. It had become polluted by the negligence of two parish clerks, who had caused, or permitted, certain bloodshedding within its walls. The church was, therefore, closed to every kind of divine service until ceremonially cleansed. The solemn office of reconciliation of a polluted sanctuary was an episcopal function, but mitred abbots were, as a rule, permitted, by papal dispensation, to consecrate and reconcile churches which were in their own gift. The town of Watford had to pay heavily for this affray in their church, for the Abbot remained there for two days, having in his train twenty-four mounted attendants, as well as eight of his monks. The whole cost of their entertainment had to be defrayed by the parishioners. Such expenses doubtless acted well in ruder times as a check on brawling in church.

NOTES.

Tintern Abbey.

THE report of the Commissioners of Woods and Forests as to the condition of work on Tintern Abbey during last year, which has just been issued, shows that in some respects the vesting of these interesting and charming ruins in the Government came none too soon. The east window was in so dangerous a state, especially the large centre mullion and the remains of the tracery in the head of the window, that the stonework has consequently had to be reset. This and other work seems to have been undertaken in a purely conservative spirit, and was necessary if the remains of the Abbey were not to become more ruinous. Some visitors have already complained that the "atmosphere" of Tintern has been lost by this work. Unfortunately there is sometimes no choice either between the loss of the mediæval feeling and the loss of the building. Ruins will not always remain in a particular state, and it is impossible, if work is done, not to interfere with the poetic feeling which comes from the sight of time-affected buildings—moss and ivy covered. We somewhat regret, however, to notice that "interesting discoveries have been made," "the dwarf wall of the cloisters and the drains from the lavatory" have been laid bare. The charm of Tintern arises from the beauty of its situation and the grace of its remaining part, and to make it a mere archæological curiosity would be to rob it of the loveliness which surrounds it, and to turn it into a mere museum. "The landscape with the quiet of the sky," as Wordsworth found in 1798 when he wrote the lines at Tintern, is what one comes to this delightful spot to enjoy.

Workmen's Compensation Statistics.

IN the recent Parliamentary paper dealing with the Workmen's Compensation Acts and the Employers' Liability Act it is shown that the number of cases carried to the Court of Appeal showed a decrease for the year 1904 as compared with the year 1903, although the number of cases brought in the County Court showed an increase. This is evidence that the difficulties caused by the extraordinary form in which the Workmen's Compensation Acts were drafted are at last being elucidated. Nevertheless, the number of cases carried to the Court of Appeal is very large indeed when it is remembered that these Acts were an attempt at rustic justice—*i.e.*, Acts which illiterate men would be able to avail themselves of without legal assistance. Of cases of death in England and Wales out of which claims arose the number was 2,065, and of these 524 were the subject of proceedings, but not necessarily of trial, since some were settled after the institution of proceedings. No percentage can be given in the case of injured persons, since no machinery exists for obtaining exact statistics of persons suffering an injury incapacitating them for more than fourteen days. The evidence before the Departmental Committee showed that the number of cases litigated was small in comparison with those settled by arrangement, and the year 1904 seems to have proved no exception to those dealt with in the Report of the Committee.

By-laws Relating to "Lodging-Houses."

A PUBLIC inquiry has been held before one of the inspectors of the Local Government Board in connexion with the new by-laws regulating lodging-houses proposed by the Woolwich Borough Council, and the chief subject of complaint seems to have been the registration of such houses without notice. It was stated that the giving of notice had not been sanctioned in any by-laws made since 1897, as it defeated the intention of the Legislature. A much more important point seems to us to be the definition of what is to be included in the word "lodging-house." In such by-laws the definition generally adopted is "a house or part of a house which is let in lodgings or occupied by members of more than one family." Now it is obvious that such a definition is far too wide; it includes houses let in Harley-street to two medical men, and may even embrace a house where one boarder or even a child is taken in. This was certainly not the intention of the Legislature, as it cannot have been seriously intended that such houses should be subject to inspection and to cleansing and limewashing at stated times. If section 94 of the Public Health (London) Act, 1891—the section under which such by-laws are made—is studied, it will be seen that the Act contemplates the sanitary authority making and enforcing such by-laws as are requisite for "fixing the number of persons who may occupy a house or part of a house which is let in lodgings or occupied by members of more than one family and for the separation of the sexes in a house so let or occupied," and the other provisions are all made subject to this. The by-laws which do not fix the number therefore deliberately fail in carrying out the intention of the Legislature. These by-laws have already been the subject of judicial comment in reported cases, some of which were noted by us in our issue of February 13, 1904, and some of them have been held to be invalid; but we strongly urge that the Local Government Board should refuse to confirm by-laws containing so loose a definition of lodging-houses as that mentioned above. It was not the intention of the Legislature that the local authorities should expend public funds in inspecting the houses this definition embraces, nor that any but a limited class of owners and lodging-houses should be subject to the drastic provisions contained in the Act. The proverb that an Englishman's house is his castle is quickly being shorn of all meaning; but it would be too much if he were to be subject to spring-cleaning and limewashing at times to be fixed by the local authorities.

Registration of Motor-Cars.

A CURIOUS point on motor-car law was decided by a police magistrate last week. Certain manufacturers were summoned for permitting a car to be driven unregistered. The defence was that under section 2 (*b*) of the Motor-Car Act the car was properly covered by the manufacturers' general identification mark as being used on trial only. The evidence was that the machinery, or chassis, was new, but the body of the car was old, and the bonnet was old, these portions being used only to enable the machinery to be tested. The magistrate decided that the body of the car formed no part of the machinery to be tested, and dismissed the summons. The learned magistrate observed that the question to be determined was, What is a motor-car? and that the present case had not been contemplated by the Legislature. A motor-car is defined by reference to the Locomotives on Highways Act, 1896, as any vehicle propelled by mechanical power under a certain weight, so it is certain that the vehicle in question was a motor-car, and the question would seem to have been one rather of fact. Was the car under the exemption contained in section 2 (*b*) of the Motor-Car Act, 1903? That exemption applies only to "any car on trial after completion or on trial by an intending purchaser," and motor-car manufacturers should accept the above decision with caution. If the above car was not intended to be sold as it stood on the old body, the contention that it was completed would seem impossible to be sustained, and if it was not being tried by an intending purchaser it would appear not exempt. The magistrate's decision has carried out the spirit of the law, but a superior court might consider the letter of the law.

Motors and the Roads.

IT is stated in the *Times*, October 2, that the Kent County Council "have agreed to a proposal" that certain roads shall be treated with tar in order to cope with the dust raised by motor-cars, and that the cost shall be shared between the County Council and the District Councils. The Urban Rural District Council (Canterbury) has circulated a letter throughout the county saying that, having regard to the heavy expenditure already incurred upon the roads in Kent, they view with dismay this proposal to increase the burden. The letter very properly points out that the roads have proved adequate for the

purposes of the public, and that no inconvenience was experienced from dust before the advent of the motor-car, and that the majority of the motor-cars contribute nothing to the District Councils, although house property contiguous to the roads has been seriously depreciated. Kent is a very great sufferer by the motor-car traffic from the Metropolis, and the depreciation in property from dust is not limited to house property, but is equally serious to the fruit and hops. The persons who have to expend money to abate this nuisance should certainly not be those who have already suffered so severely in pocket by its creation. The migratory motorist interferes with the use of the roads for business purposes, and the ratepayers should not be taxed for his convenience.

Coast Defences. THE recent northerly gale and consequent high tides have been followed by the usual record of damage to the cliffs and protective works at various exposed places on the East Coast. At Scarborough the new marine drive, still under construction, along the front of Castle Hill, was once more in trouble. Some 60 ft. of the wall were demolished, and about 100 sq. yds. of asphalt paving, together with a considerable length of iron railing, were washed away. The new protective works at Southwold were virtually destroyed, and hundreds of tons of the cliff, undermined by the water, have been carried away. In contrast to the feeble resistance offered by massive works built upon easily destroyed foundations, we have ample proof of the efficient protection afforded by the sand dunes of Suffolk and Norfolk. These natural defences, bound together by the marrum grass, withstand the action of wave and tide, while the more ambitious works of man perish ignominiously. The lesson is that in coast protection works of the future far more attention should be paid to the accumulation of shingle and sand by means of groynes, than to the building of expensive and futile masonry walls and other works. The sea must be humoured rather than defied.

The New Bridge at Budapest. CONSIDERABLE interest attaches to the chain-cable bridge at Budapest as a handsome example of construction and an embodiment of the most advanced suspension-bridge design. Crossing the Danube in a single span of 957 ft. between the piers, the bridge has a total length of 1,235 ft. and a width of about 60 ft. The towers at each end are hinged on steel pivots attached to cast-iron plates upon the top of the piers at each side of the river, thus permitting the towers to move slightly in response to the varying pull of the cables. The cables are built up of eyebars and comprise two pairs, one above the other at each side of the bridge, the upper cables passing over saddles, and the lower cables being fixed at the tower heads. The platform is stiffened by two longitudinal lattice girders extending from end to end of the bridge, and lateral bracing is provided by four lattice girders and counter-bracing for each length of 20 ft., the main girders being attached to the suspenders at the cross-girder connexions. In one respect the new bridge is open to criticism, for, instead of stiffening the platforms in the manner described, it would have been preferable if the cables themselves had been incorporated into parabolic ribs. This type of design would have had the effect of giving a marked increase of stiffness and probably of reducing the cost of construction by a considerable amount.

Modern Locomotives. JUDGING by the returns for 1904, railway companies have ample reason for gratification in the results obtained by the use of the larger types of locomotives which have been introduced upon their systems. So far as concerns goods traffic alone, the companies carried last year 34 million tons more merchandise than in 1901, with a saving of nearly 18 million train-miles and a reduction of 71,000*l.* in wages. If the same amount of traffic had been dealt with by the methods followed in 1901, fully 32 million more train-miles would have been run with a corresponding increase of the wages bill. The figures afford a striking demonstration of the advantages conferred by the advance of locomotive design, but the satisfaction of the companies is by no means shared by engine drivers and firemen, for, as stated this week by the President of the Amalgamated Society of Railway Servants, hundreds of the men are now out of employment, hundreds of drivers are reduced to firing, and hundreds of firemen to cleaning. The position is one which railway employees very naturally regard with anxiety—a mental condition that will most likely be aggravated as electric traction comes more and more into use.

Railway Amalgamation in Scotland. THE North of Scotland is not a little perturbed, almost excited, by the proposed amalgamation of the Highland Railway Company with the Great North of Scotland Railway. The headquarters of the first company is Inverness, of the second Aberdeen, and Inverness will, under the proposed arrangement, lose the business which arises to the city from this fact. But the arrangement, when agreed upon by the two boards of directors, will have to be ratified by the shareholders and by Parliament. It is by no means as yet certain, therefore, that the matter will go through, especially as it arouses so much local feeling. It is obvious, however, that such an arrangement is to the benefit of the shareholders if fairly worked out, and it should also be a benefit to the Highlands by the creation of one strong company in place of two rather weak financially. There is now very little competition between the two companies, for the Great North of Scotland's territory extends to the east of that of the Highland Railway, and therefore the public advantage to be gained by competing systems is not in jeopardy under the proposed arrangement.

No. 17, Fleet-street and Inner Temple Gate. WRITING to the *Times*, Mr. E. S. Mostyn Pryce tells one or two fresh facts which appear to relate to the house of which the original front may now be seen *in situ*, having been restored, together with the painted ceiling, at the South Kensington Museum under Sir C. Purdon Clarke's superintendence. Mr. Mostyn Pryce says that among his muniments at Gunley is a parchment dated February 5, 1656, which recites that Richard Pryce, of Gunley, a member of the Barebones Parliament, had in that year "lately purchased of the Protector under an Acte for selling the houses manors and lands heretofore belonging to the late King Queene & Prince all that House and Stables situat lyeing and being in the Citie and Countie of Middlesex." As Richard Pryce's last will of February 20, 1674, contains no mention of "The Dutchy House" he infers that at the Restoration Richard Pryce "restored" the property, but he is somewhat at fault in his chronology in adding, "and we further know that the ancient palace was Royal property again in the reign of James I." The traditionary association of the house with Henry VIII. and Cardinal Wolsey cannot be sustained; there is however reason to believe it contained the Council Chamber of the Duchy of Cornwall in the time of James I.'s son, Henry Prince of Wales and Duke of Cornwall. In a "Note" in our issue of January 21 last we gave some particulars of the building, and of its predecessor bought by Richard Tottell in 1556, showing that the present house is identical with the Prince's Arms, afterwards the Fountain Tavern, which, together with the Inner Temple gateway and the narrow house over the gate, one John Bennett rebuilt in 1610, in covenant with the Benchers of the Inner Temple. The gateway is to be set back in alignment with the former frontage, so that the "jettie" of Bennett's building again projects over the pavement.

The Baillie Gallery. MR. JOHN BAILLIE'S Gallery at No. 1, Prince's-terrace, Bayswater, is at present given over to an exhibition of paintings and sketches by Mr. C. Percival Small and Mrs. E. M. Roughton as well as a collection of curious paintings and handicraft from Tibet. Mr. Small's drawings are on a high plane of excellence—quiet, refined work recalling that of the water-colourist of forty years ago. The treatment of No. 14, "Heathland," without the exquisite detail of John Ruskin's drawing, reminds us of his work. "Harwich Harbour" is a study of atmospheric effect, as also is the drawing entitled "Frosty Morning"; both these subjects are difficult ones, and in both the theatrical element has been avoided and nature portrayed as seen by an artist. Shanklin, Isle of Wight, is a delicate drawing. "Trimley, Suffolk," and "A Sunny Corner" are full of colour and sunshine. "The London Sketches" of Mrs. E. M. Roughton are valuable records of vanishing corners of Old London, but they lack the inspiration of artistic handling. The collection of paintings and curios from Tibet are interesting as the native work of a comparatively unknown country.

The Black-Frame Sketch Club. AN exhibition of pictures by members of the Black-Frame Sketch Club is now on view at the Royal Society of British Artists. Why a society should pledge themselves

to black frames we do not know. If frames have to be uniform we prefer them in gold. The truth, however, is that some pictures look best in black frames and some in gold, while others will look better in white than in either black or gold. The most successful picture-framing at an exhibition that we remember to have seen was that shown by Mr. and Mrs. Adrian Stokes some years ago when they were holding an exhibition of their paintings in Bond-street. The Black-Frame Sketch Club include some clever artists among their exhibitors. Amongst much that is clever and nothing else Mr. F. Heath's work stands out; it is broad in treatment, clean in colour, and shows healthy sentiment. The "Story of Susette" (No. 73) is delightful. Both in this picture and in 157, "A Prayer to St. Barbe," the figures are finely done; from study such as these indicate, good work should follow. Mr. Paul Paul's "A Breezy Day" and Mr. S. E. Scott's "Port St. Michel, Paris," are noticeable drawings, as also is that by Mr. S. I. L. Birch entitled "Carn Dhu, Lamorna." Mr. T. T. Blaycock shows a large number of drawings, the most satisfactory of which perhaps is No. 20, "A Dusty Road." Mr. Reginald Frampton's "St. Dorothea" is an ambitiously handled subject of unsatisfying quality. The drawings on the screen by I. Friedensen are some of the best in the exhibition.

The Avon Gorge.

ALTHOUGH the Bristol Corporation have been so far influenced by public opinion as to form a special committee for the preservation of the Avon banks, matters do not progress very rapidly in the desired direction. We believe that the Corporation have already decided to find some source of supply for road metal away from the Avon gorge quarries, and have approached the chief landowner with a view to arranging for the purchase of the wooded banks now in course of spoliation. For the moment, however, there seems to be some kind of hitch in the negotiations, and it is gratifying to find that the Avon Gorge Preservation Committee are by no means relaxing their persistent efforts to bring the matter to a successful conclusion, so that the beautiful gorge of the Avon may be preserved for the use and enjoyment of the public for all time.

COTTAGE HOSPITAL, ABERTILLERY.—It is proposed to erect a new cottage Hospital at Abertillery, Mon., and at a meeting of the hospital committee recently, Mr. Arthur E. Sheppard, of Newport, was appointed architect for the proposed hospital.

CARPENTERS' COMPANY.—For the examination held at King's College last week, in connexion with the two scholarships presented by the Carpenters' Company, there were twenty-one entries, and Messrs. Thos. W. Bricknell and H. Cook were the successful candidates.

REOPENING OF THE ST. ANDREW'S HALLS, GLASGOW.—Considerable alteration has been made to the interior of the St. Andrew's Halls, Glasgow. The principal change in the large hall has been made in the back gallery, where the pillars have been removed. The whole of the halls have undergone renovation as far as concerns the painting and decoration, and also the furnishings. The grand organ has been reconstructed by Messrs. Lewis & Co., London, and a new case of Austrian wainscot oak has been erected to the designs of Mr. A. B. M'Donald, City Engineer. The blowing apparatus is worked by three high-pressure engines by Messrs. T. Melvin & Sons, engineers, Glasgow.

LETTER FROM PARIS.

IT is announced that the Ecole des Beaux-Arts has this term received twenty-two lady students out of a total of 107; a larger proportion than has ever been seen there before.

At the Académie des Beaux-Arts there is likely to be a spirited contest for the succession to the places formerly occupied by Henner and Bouguereau. The list of candidates increases daily; and includes, besides the veteran painters Harpignies and Ziem (who may be chosen, but who will not actively put themselves forward), the names of Tony Robert-Fleury (President of the Old Salon), Besnard, Gabriel Ferrier, Chartran, Toudouze, Albert Maignan, Gervex, and Raphaël Collin. The election will be made between the 21st and the 28th inst.

The Paris correspondent of the *Daily News* referred the other day to a scheme for the erection, on the site of the Tuileries, of a very large building with a central dome, which was to form the new National Library and Reading-Room. Such a scheme has actually been suggested by M. Bouchot, the curator of the print-room in the present establishment; but, though very tempting, it is far too magnificent for execution, at present at all events. The cost, which M. Bouchot himself estimates at fifty million francs (two million sterling), might no doubt be somewhat reduced by the sale of the land occupied by the present National Library; but even with this assistance it would be too much for the budget of the present Government, which can only allow the architect, M. Pascal, an annual expenditure of 300,000 francs. It will take nine or ten years, at this moderate annual credit, to complete the whole of the work now in progress (commenced in 1898); but the new reading-room, in the form of a rotunda, will be finished shortly, as also the block of building next to the Rue Vivienne. It is not likely therefore that Parliament will vote an immense sum of money for a new and larger scheme; nor probably will the public look favourably on a project which to a great extent would deprive them of the lawns and the statuary which now decorate the site of the Tuileries.

The plans for the Metropolitan line from north to south of Paris have been approved. The central line will start from the Gare Mont-Parnasse, following the lines of the Boulevards Mont-Parnasse and Raspail, and dividing into two tubular sections at the Boulevard St. Germain; these will pass under the Seine below the Pont de la Concorde. On the right bank the double tube railway will run to the Rue Royale, where it will become single and will go round the Madeleine to gain the St. Lazare terminus by the line of Rue Tronchet and Rue du Havre. This new line is the scheme of M. Bechmann, Director of the "Compagnie Nord-Sud," and who was the colleague of Alphand and Belgrand in carrying out the great sanitation scheme by which the sewage of Paris was taken to the plain of Achères.

The Mairie of the Xth Arrondissement, of which M. Rouyer was the architect (and which was illustrated in the *Builder* of April 11, 1896), has remained still unfinished in regard to its decoration. The Municipal Council have now taken the matter up, and have selected the artists who are to put the finishing touches to the building. The two principal fronts are to be decorated with eight stone statues symbolising the principal industries of the quarter. Those on the façade towards the Faubourg St. Martin are to represent river navigation, glass-work, embroidery, and ceramic ware; these will be executed by MM. Barrau, Demaille, Moncel and Larche. The four on the façade towards the Château d'Eau are to represent silversmith's work, artificial flowers, perfumery, and theatrical art. They will be executed by MM. Carlus, Caussé, Chrétien, and Gaston Leroux. In the interior M. Henri Martin is to take in hand the large panel in the Salle des Mariages, and a number of other artists, among whom are MM. Paul Baudoüin and Béroud, are to paint the vertical panels and the ceilings of the two rooms which adjoin the Salle des Fêtes. A sum of 118,000 francs has been voted for the work.

M. Girault, the architect of the Petit Palais, has, at the request of the Council, been preparing a plan for increasing the wall-space and the lighting of the galleries by the introduction of additional partitions and the formation of ceiling lights. This will enable the small objects in the Dutuit collection, which are now scattered over a large space, to be more concentrated and seen in a more direct light. The basement story, which has been occasionally lent for private exhibitions, is now to be devoted entirely to the permanent collection of drawings (including those of Puvis de Chavannes), engravings, and sculpture models.

The Carnavalet Museum is to be much extended, and the arrangements for this work will be one of the first things before the Municipal Council after the recess. The present galleries are insufficient, and the store-rooms of the museum are full of objects of interest which cannot at present be exhibited. The alterations at the Hôtel de Ville will also shortly occupy the attention of the Council. The Caserne Napoléon, in Place Lobau, having become the property of the Municipality, the financial department is to be transferred there, and the new Council-room built in its place. This is to be on a semi-circular plan, which will necessitate a considerable alteration in the exterior design of the Hôtel de Ville on the side next the Rue de Rivoli.

The Musée de Marine is now to become a part of the art galleries of the Louvre; and in preparation for this transformation a number of historic or pre-historic objects, brought home by navigators or explorers, are being transferred from it to the Musée de St. Germain. The Chinese and Japanese objects forming the Mac-Mahon collection will be removed to the Trocadéro; and the models of ships are to be removed to the Hôtel des Invalides, where the military museum is already formed. The present contents will thus be entirely dispersed, and the galleries left free for receiving some of the art-treasures of the Louvre for which space is at present wanting.

M. Blavette, the architect to the Natural History Museum, has presented to the department of "Bâtiments Civils" a plan for a large rotunda building to be erected in the Jardin des Plantes, near Rue Cuvier, for the larger wild beasts, which are at present very badly housed. The centre of the rotunda, which will be elliptical on plan, is to be occupied by a basin of water surrounded by parterres of flowers, with a large gallery for the public between these and the cages. The cost is estimated at a million and a half of francs.

Work is to be commenced soon for the re-building of the Ecole Polytechnique, in which the first step will be the demolition of the house in the Rue Descartes, which at present forms the Cour d'honneur of the Ecole.

An interesting piece of work is about to be undertaken at the church of Saint Sulpice, the north façade of which is to be decorated according to a design made, in 1724, by François Dumont. The model for this has been accidentally discovered in a room in the roof of the church. The model shows a circular pediment terminated by groups of children, and with a central design in which the Pontifical Tiara and Keys are combined beneath a cross. The whole design is to be carried out in the place for which it was originally intended, over the north porch. The work is undertaken at the suggestion and with the support of the Vieux Paris Committee.

PRIMITIVE METHODIST CHURCH, KETTERING.—The foundation stones were recently laid of a new Primitive Methodist church which is being erected in Bath-road, Kettering. The building is being constructed by Mr. O. P. Drever, of Kettering, from the plans of Messrs. Buttery & Bird, architects, of Moseley, and will provide accommodation for about 650 people.

THEATRE, EDINBURGH.—At the Edinburgh Dean of Guild Court, on the 29th ult., the plans were passed for the new theatre which is about to be erected by the Edinburgh Construction Company at the corner of Leven-street and Tarvit-street. It will be a three-tier theatre, and the auditorium will be 200 ft. in length and over 70 ft. in breadth. The main entrance is to be from Leven-street, and there will be entrances from both sides—Tarvit-street and the lane which runs parallel with it. The architects are Mr. J. D. Swanston, Kirkcaldy, and Mr. James Davidson, Coatbridge.

THE ELECTRICAL EXHIBITION.

THE Electrical Exhibition at Olympia is a most interesting one. What it has to teach can easily be learned, and one is not oppressed with a multiplicity of exhibits. The recent electrical exhibitions at Paris, Düsseldorf, and St. Louis were almost too large. Unless one specialised in a particular department, it was hopeless to get a clear idea of what was being done in the manufacturing world. The present exhibition is more for the user of electricity than for the manufacturer, and is proving a success.

The Robertson Electric Lamp Company and the Edison & Swan United Electric Light Company have turned their stands into miniature factories, so that the process of making glow lamps can be watched, and the skill of the workgirls will be found worthy of admiration. The last electrical exhibition in London was at the Crystal Palace in 1892. Glow lamps were then 3s. 9d. each, and practically the only type of arc lamp was the "open" arc. Although the price of glow lamps is less than a third of what it was fourteen years ago, yet their finish is much better, and their efficiency and durability have very considerably increased. Of the many hundred arc lamps exhibited hardly any are of the "open" type, the majority being either "flame" arcs—that is, arcs which burn between carbons which have cores containing various chemical salts—or "enclosed" arcs, which are entirely screened from the air, and the carbons of which, consequently, last ten times as long as when burning in the open air. The distinct feature of this exhibition is the number of arc lamps exhibited. We were sorry, however, that no firm exhibited the magnetite arc lamp of Professor Steinmetz, of America. The chief novelties exhibited were tantalum lamps, osmium lamps, and mercury vapour lamps of a new and greatly improved pattern. Many forms of electric radiators for heating are shown, and the Dowsing Company have an attractive exhibit of electric cooking. The Post Office exhibit is not unlike that shown at the Crystal Palace Exhibition, but we have now a large exhibit by the Marconi Company, who show all the apparatus required for wireless telegraphy. The most useful exhibits are those which illustrate the various uses to which small motors may be put. We think that it would have been in the interests of the electrical industry if greater attention had been given to this point by exhibitors. Electricians are able to appreciate the various uses of motors, but the public will not buy them until they actually see them driving sewing machines or brushing boots. The varieties of electric motors which bewildered the public in 1892 have been reduced to a few standard types. They are now nearly all "protected." They have generally four poles, laminated pole pieces, slotted armatures, and self-oiling bearings. Carbon brushes also are practically always used. There is much to interest the technical expert, and even the scientist in the exhibition. We have never seen a neater application of the principle of resonance to a measuring instrument than that shown in Frahm's speed indicator, shown by Messrs. Lucy & Co.

The General Post Office exhibits both an historical and a modern section. The former is of more general interest than the latter, which can only be fully appreciated by the telegraph expert. A high-speed duplex automatic apparatus, with repeater, is shown in working order. This is the method adopted by the Post Office for transmitting press and special news. The message is first recorded on slips of paper by punching holes in them, the sequence of the holes expressing the words in the Morse code. The rest of the transmission is entirely automatic. Quadruplex apparatus is also shown for sending four messages simultaneously by a single wire, two going one way, and two the other. In the historical section Wheatstone's instrument, Bright's bell, Varley's relay, and Thomson's (Lord Kelvin's) electrometer are shown. A telegraph pole, damaged by woodpeckers, and Cooke's original goose quill insulators are interesting and curious. The exhibit of the Marconi Company, which is also in the gallery, is instructive, and the working of the apparatus is much simpler and easier to understand than the complicated automatic devices used in multiplex telegraphy.

Manufacturers are well represented. The stands of Messrs. Drake & Gorham are particularly instructive. No. 3, which is labelled "general estate appliances," shows a three-throw pump, a cream separator, a churn, etc., all driven electrically. Full data as to the cost can also be obtained. They show a working model of a service lift on the push-button control system, which is getting so popular. A dining table, tastefully arranged, the lamps being supplied with current by white silk flexible cord, is shown in their third exhibit (55 and 60). Messrs. Drake & Gorham are the agents for the well-known Nernst lamps, which they now enclose in well-made iron cases. The Phillips' grinder for smoothing commutators should prove useful.

The exhibit of Messrs. Ferranti will be of interest to station engineers. They exhibit a switch-board of the well-known "cellular" type. The current and pressure transformers, switches, meters, etc., are enclosed in separate cells, and, from the point of view of simplicity and safety, it is deserving of high praise. The high-tension feeder charging gear is cheap, and seems excellently adapted to fulfil its functions.

The Electrical and Ordnance Accessories Company, Ltd., of Birmingham, show a model passenger lift, the motor, with its automatic control, being geared for a low speed, so that its working can be studied. The row of Stellite motors, ranging from ¼ h.p. to 15 h.p., provided with various kinds of gearing, is a very instructive exhibit. Messrs. Vickers, Sons, & Maxim show a very large planing machine, electrically driven, and fitted with automatic reversing gear. The speed of the motor is varied entirely by shunt regulation, and its efficiency is never less than 87 per cent. As the extremes of speed are nearly in the ratio of 4 to 1, it will be seen that this result is extremely satisfactory. We would advise all electricians to make a special study of the method of driving and controlling the speed of this planing machine. On the cutting stroke the motor runs at its lowest speed, but on the return stroke it runs at its highest speed, and thus the maximum work is done in the minimum time.

The Langdon-Davies Company have a very interesting exhibit of electric motors for alternating and direct current. In a pamphlet they issue, full particulars are given of the running costs of motors for driving printing presses, sausage machinery, chaff-cutting machines, hair-cutting machines, etc. It is interesting to remember that this motor is the outcome of a theoretical study of the properties of a rotating magnetic field made by Mr. Langdon Davies some twelve years ago. It is one of the few alternating current motors that were invented in this country. The Lahmeyer Electrical Company have a most praiseworthy exhibit. They are one of the very few firms that show large machines in operation. The high-voltage synchronous motor is of typical German design, and, from the theoretical point of view, it is practically perfect. They also exhibit electrically-driven hauling and winding gears of various types. The Fuller-Wenström Company also show some excellent single-phase and polyphase motors of their well-known design.

The Phœnix Dynamo Company show some excellent machines. The large motor generator exhibited should be studied with the help of the clear description given in their pamphlet. The small 3·5 B.H.P. variable speed motor is of very creditable design. Its speed can be varied between 425 and 1,800 revolutions per minute by regulating the shunt resistance alone. This is accomplished by means of a very ingenious system of auxiliary poles. It runs sparklessly, and is capable of withstanding a 50 per cent. overload for short intervals at any speed. The exhibits by Electromotors, Ltd., and Spagnoletti & Co. also deserve a visit. A large number of electrical instrument makers have exhibits. One of the best is that of Messrs. Elliott Brothers. The highly-novel network ohmmeter, made by Mr. Groves, which gives the insulation resistance of the whole network by a single reading, is worthy of the attention of every station engineer. This method of measuring insulation resistance was described by Mr. Alexander Russell in the *Journal* of the Institute of Electrical Engineers some six years ago, and we drew attention at the time to the importance of station engineers measuring their leakage currents by his method. We are glad to see the method in concrete form, and it would be in the best interests of station engineers if the Board of Trade would insist on their making weekly records of the insulation resistance of their networks. Mr. Russell, in the paper referred to above, shows how this resistance tells us practically the leakage currents which are flowing from the mains, and the power wasted by these currents. It is notorious that the readings of the present Board of Trade ammeter in the earth connexion with the middle wire are of no value. Messrs. Elliott Brothers exhibit a substantial marble switch-board, in addition to their recording voltmeters and ammeters, and their well-known instruments for standardising laboratories and for workshop use.

Messrs. Nalder Brothers & Co. show a "flicker" photometer, and all the appliances required for photometric work. Messrs. Everett, Edgcumbe, & Co. show a very novel recording voltmeter and various types of accurate measuring instruments. The exhibit by Messrs Fricker & Miller of thermal volt and ampère meters is of great interest, as the instruments are of very novel design. They also show the well-known Mordey-Fricker electric meter.

The electric lamp makers are very well represented. The process of making Robertson and Ediswan lamps is shown fully; the brilliantly-lighted stands, the neat uniforms, and the skill of the workgirls eliciting the admiration of the visitors. The General Electric Company show the new osmium lamp, but it is still, to a certain extent, in the experimental stage. The Sunbeam Lamp Company show a new "reducing" lamp which meets the demand for a lamp the light given by which can be regulated. The Sir Hiram Maxim Electrical Company show various types of glow lamps. Messrs. Oliver & Co. show the "Oriflamme" arc lamp, which has a very high efficiency as an energy transforming device, and presents many points of interest. D. Santoni & Co. exhibit "Intense Flame Arc Lamps," and Messrs. Nalder Brothers & Thompson Foster arc lamps, which are quite as good as any of the very numerous midget arc lamps we have seen.

Practically all the makers of storage batteries have exhibits. The Electrical Power Storage Company exhibit many types, from the small batteries required for working the ignition tube of a motor-car petrol engine up to the complete battery of cells in fifty-five glass boxes, which is utilised for lighting the stand. The Hart Accumulator Company, Longstreth's, Ltd. (who make the well-known lithanode cells), Messrs. Pritchetts & Gould, and the Tudor Accumulator Company have all excellent exhibits. The Tudor Company show a cell with a capacity of 7,500 ampère hours.

Messrs. Falk, Stadelmann, & Co. show some striking designs for electric fittings. The Simplex Company have a very complete exhibit of their well-known system of conduits. Messrs. Escaré & Denelle, Ltd., show electroliers, brackets, and artistic fittings.

The Temperley Transporter Company show working models of their "patent traveller," travelling tower transporter, and a portable transporter fitted to a ship's derrick. The Bat Electrical Company exhibit their interesting "permutators" for converting alternating current into direct current. These machines should prove of value to householders supplied with alternating current who desire to charge motor-car batteries, etc. They can also be usefully employed for running arc lamps when the frequency of the alternating supply is low. They are very novel, and the theoretical description of their action given to us was most interesting.

The Pearson Automatic Fire Alarm, Ltd., show specimens of their latest fittings. We have tested these practically, and find them quite satisfactory. Messrs. Hunt & Hess show samples of litholite for insulating purposes. This material can be moulded accurately, and is of high dielectric and mechanical strength. It seems to us admirably suited for various electrical purposes. Mr. Leonard Shaw shows a "continuous

rotary" electric copying machine. The blue printing is done by means of an arc lamp, and the rate at which the copier works is 2 ft. per minute. The Dowsing Radiant Heat Company have an excellent exhibit. They show their radiant heat baths which are now extensively used in everyday medical practice, several of their well-known heat radiators, and numerous appliances for electric cooking. For cooking purposes electricity is almost the ideal method of obtaining heat.

Messrs. Lucy & Co., Ltd., of Oxford, amongst other interesting exhibits, show Frahm's speed indicator. It can be adapted so as to tell the frequency of an alternating current, and it can be used as a revolution counter, or a speed indicator. It is a wonderfully neat application of the principle of resonance to a practical instrument. We believe that Professors Ayrton and Perry patented a somewhat similar instrument in this country many years ago.

On the stall of the St. Pancras Borough Council we picked up a pamphlet entitled "Electricity: Useful Hints." We can recommend this pamphlet to those who like positive assertions stated in what may be politely termed colloquial English. In conclusion, we can recommend all those interested in the applications of electricity to visit the exhibition. Mrs. Deane gives free lectures and demonstrations on electric cooking at 3 p.m. and 8 p.m., and several well-known electrical engineers will give evening lectures.

PRIEST'S STALL, ST. ANDREW'S, CATFORD.

THE view shows one of the two priests' stalls fixed in the Church of St. Andrew, Sendhurst-road, Catford, S.E. It was not an easy matter to get good figure-work out of "3-in. stuff," but the photograph shows the success of the experiment. The materials are specially selected Austrian oak lightly fumed, with grey-white gesso applied to the sunk background of the panel. The stalls and screen are being designed in the same key, and the pulpit is fixed. All this woodwork and carving was executed admirably in the studios of Messrs. Daymond & Son, of Westminster. PHILIP A. ROBSON.

SUGGESTED AMENDMENTS TO THE MODEL BUILDING BY-LAWS FOR NEW STREETS AND BUILDINGS.*

AT the request of the President, and in order to give the members an opportunity of discussing some of the suggested amendments to the Local Government Board's Model Code of Building By-laws, the author has prepared the following few notes. For the past eighteen months a special committee, appointed by the Council, has been considering this important subject. As a result of their labours a report was submitted, together with certain amendments and suggestions, to the Local Government Board's Code. This report was considered and approved at a special meeting of the Council, and has been submitted to the Board.

In considering this question the committee had particularly in mind the following objects:—

1. To ascertain whether the existing by-laws can be modified so as to lessen the restrictions, which are said to exist, in such a way as not to affect the stability and safety of buildings both in urban and rural districts, at the same time securing that the laws of Public Health may be adhered to.

2. Whether such modifications would make it possible to reduce the cost of the erection of buildings, more especially for the artisan class.

3. If any, and which, by-laws could be altered with advantage to the general public.

The question of the possibility of reducing the cost of erecting cottage property by modifying the by-laws requires very careful consideration as affecting owners, tenants, and the general public. The consequence of such reduction would probably be, on the one hand, the erection of houses which could let at a less rent than is at present charged for houses of similar accommodation, and, on the other hand, a considerable modification of the by-laws might open the door for the erection of less substantial and unhealthy dwellings. By-laws are framed chiefly for the purpose of securing conditions of health for the individual and the community, stability of property and security from fire, and, in their consideration, these objects should be kept constantly in view. The by-law committee, after careful consideration, have come to the conclusion that modifications can be made without in any way endangering any of the above principles, and have offered, as already stated, to the Local Government Board many suggestions on these lines for their consideration.

The author suggests various additions and amendments to the existing model building by-laws for both urban and rural districts as follows:—

Interpretation of Terms.—Many of the larger towns and urban districts in their latest by-laws have provided for the definition of the following terms used in the by-laws, such as "surveyor," "foundation," "topmost story," "lowest story," "ground story," "ground floor," and also definition of fire-resisting materials; these should be included in the Board's Model Code. Owing to the erection of flats and composite buildings a definition is needed to cover such; this is, of course, more particularly felt in large towns.

Exempted Buildings.—By-law 2, paragraphs H to L (inclusive).

Considerable expense and difficulty is now experienced, owing to the necessity under the by-laws of having to submit plans of such buildings as plant-houses, aviaries, fowl-houses, coal-houses, and similar structures, and it is suggested that these buildings might be erected on permission being obtained from the sanitary authority, so long as the minimum area of open space required under the by-laws is not interfered with, and the sanitary requirements are complied with, without the necessity of submitting plans, provided seven days' notice in writing is given to the local authority before the erection of such a building. At the present time most by-laws require buildings to be of brick, stone, or other incombustible material.

In order to allow of buildings being constructed of other suitable materials than brick or stone, under certain conditions, a by-law providing for the external walls being constructed of suitable material of adequate strength to secure proper stability, and constructed to be weather-proof, should be included; this would to a very large degree remove, especially in rural districts, the present outcry against the cost of building, and would allow of half-timbered buildings, buildings of wood and corrugated iron, reinforced concrete, and other forms of construction.

The author would here point out that other circumstances have materially added to the cost of buildings, such as the increased cost of materials and labour, and the restrictions as to hours and rules in various trades; rents of cottage property, too, are undoubtedly increased to meet the increased rates and taxes, both local and national.

* Being part of a paper by Mr. Albert D. Greatorex, A.M.Inst.C.E., Borough Engineer and Surveyor, West Bromwich, read at the annual meeting of the Incorporated Association of Municipal and County Engineers, held at Norwich, June 22, 23, and 24.

Priest's Stall, St. Andrew's, Catford. Mr. Philip A. Robson, Architect.

With respect to the Level, Width, and the Construction of New Streets.—In framing by-laws every district has adopted a certain minimum width, according to the individual views of those drafting or having the approval of the by-laws.

After careful consideration the committee adopted the following recommendation :—

That the minimum width of streets for urban districts should be as follows :—

(*a*) 40 ft. for side streets.

(*b*) 50 ft. for more important streets.

(*c*) 60 ft. for streets that are main lines of communication or in continuation with same.

In rural districts no street should be less in width than 36 ft., and all main lines of communication should be 25 ft. from the centre of the road to the forecourt wall. Narrow roads, whether in urban or rural districts, are a mistake, a great inconvenience, and a source of danger to the public, especially under the present conditions of traffic. Enormous sums are constantly being paid to widen streets, and what is a county district to-day may very soon become part of a more populous area. In country districts, if the required distance were kept between the building lines, it would be possible to allow of forecourts being provided, and the streets made narrower than suggested, so that they could be widened at any future date at small expense, and so save expensive street construction in the meantime.

As regards the width of footways and carriageways and the specification for street construction, these should be left to the local authority to determine in the large districts, as is generally done at present in many towns under private Acts, and in small urban and rural districts the model code should be enlarged to provide for a more complete detail of the method of construction so as to leave no loophole of doubt as to what is required.

With respect to the Structure of Walls.—Very few by-laws provide for the interpretation of the following terms, and these should precede the clause dealing with building construction—namely, "sand," "lime," "cement," "lime mortar," "cement mortar," "concrete," "plaster," "asphalt," and similar terms; these should be complete both as regards the quality of the material, composition, and other details.

By-law 14.—Provides for the erection of new buildings of brick, stone, or other hard and incombustible materials, properly bonded and solidly put together with cement, lime, or cement mortar, and provides for certain exceptions as hollow walls and half-timbered buildings.

Provision should be made for the thickness of material other than brick or stone under this by-law; the model code has no provision for walls constructed of iron or steel framing, this should be included, and also provision made for reinforced concrete, or other similar construction.

All iron or steel-framed buildings should be covered with, embedded, or encased in, concrete or other fire-resisting material.

By-law 21.—As regards thickness of cross-walls.

This by-law has a very important bearing on the thickness of external and party walls, inasmuch as the existence of proper cross-walls of the required thickness determines the length, and consequently the thickness, of such external and party-walls.

The author suggests that this by-law be amended so as to provide that a pillar or buttress of a length of not less than one-tenth of the height of such wall, but in no case less than 3 ft. in length be allowed in substitution for the wall carried through from back to front.

By-law 22.—As to the thickness of walls of domestic buildings.

This and the following by-laws are very intricate ones, and give more trouble in administration than all the rest of the by-laws. The principal difficulty consists in having laid down hard-and-fast rules which cannot always be administered without the infliction of apparent hardships on the persons concerned. The principle of the rules appears to be that walls of domestic buildings less than 25 ft. high and 30 ft. long must be 9 in. thick throughout, that if either the height or length is increased the thickness of the walls must accordingly be increased as set forth.

As general rules, the provisions of the by-laws do not appear to be unreasonable, but in practice the application to cottage property sometimes presents difficulties in respect to party and gable walls, both as regards height and length as fixing the thickness.

The difficulties experienced might be very much reduced if the by-law was amended so as to allow of domestic buildings being erected up to 30 ft. in height, and 30 ft. in length, with 9-in. walls; this would allow of three-story buildings.

There is also the question whether some concession might not safely be made in respect to permitting the external walls of sculleries, wash-houses, closets, tool-houses, or ash-places, appurtenant to a domestic building, to be erected only 4½ in. thick instead of 9 in. as required by this by-law, provided these walls were built with cement-mortar, and subject to certain restrictions, such as the size of such buildings, etc., and provided that the foundations and party-walls were constructed of 9-in. brickwork. This amendment would, in the opinion of the author, be a concession of some value in the erection of cottage property.

By-law 23.—Here, again, this by-law should be amended so as to allow greater latitude as regards the height and thickness of walls for warehouse buildings, and a clause inserted dealing with external walls, which may be retaining walls. A clause might also be inserted to provide that, where a wall is constructed of cement-concrete other than ferro-concrete, the thickness should be at least one-fourth greater than that required in the previous by-laws.

Construction of Chimneys.—A by-law should be provided to deal with the construction of chimneys, to include any suitable form of construction, such as the Alphons Custodis principle, steel, or other suitable materials.

With respect to the sufficiency of space about buildings to secure a circulation of air and with respect to ventilation of buildings.

By-law 53.—This by-law should be improved by the addition of the following proviso :—

"Provided that where a scullery, not exceeding 10 ft. 6 in. in height, measured from the floor of such scullery to half-way up the roof, is erected at the back of such dwelling-house, he may cause the distance across such open space between such scullery and the said boundary to be one-fifth less than the distance as prescribed, if thereby no diminution of the minimum aggregate extent of 150 sq. ft. is involved. Provided also that any scullery to be so erected shall not be allowed to extend across the back of such building to an extent of more than three-fifths the width of any habitable room to which such scullery is attached, and provided, also, that such scullery shall leave sufficient light and ventilation for any habitable room."

By-law 56.—As regards this by-law, "one-twelfth" should be substituted for "one-tenth" of the floor area for windows where the light is unobstructed, and the top of the window should be not less than 7 ft. from the floor except for rooms in the roof, unless some additional means of ventilation be provided near the top of the room.

Also that provision should be made for ventilation of bathrooms, lavatories, and sculleries, with the exception that "one-fifteenth" should be substituted for "one-twelfth" in such cases. Pantries under staircases should also have proper means of ventilation provided.

Opening skylights for rooms partly or wholly in the roof should be regarded as windows.

With respect to the Drainage of Buildings.—In front of the by-law under this heading there should be inserted an interpretation of the following words—namely, "stoneware pipes" (this should be accompanied by a schedule for sizes, etc.), "soil pipes," "ventilating pipes," and other materials; the weight and method of jointing soil pipes and ventilating pipes should also be given.

By-law 62. *Paragraph* 2.—This by-law should be amended so as to provide for drains being laid straight, both in line and gradient, and with watertight joints, and, where practicable, with a fall of not less than 1 in 36; if the fall is less than 1 in 48, proper means for automatic flushing should be provided.

Paragraph 3.—Should be amended so that the joints of the pipe above the ground shall be of molten lead, and this paragraph should be altered so that the provision for piers should only be applied when the drain is above the ground.

Note.—By this by-law a new drain shall not be constructed so as to pass under any building unless the precautions contained in this, and the subsequent paragraphs, are observed; but where the drain is already in existence, or has been in existence more than six months, a person may erect a new building without observing any of these precautions, and the by-law to that extent requires amendment.

Paragraph 4.—Concrete not necessary in all cases; therefore add "where the nature of the ground requires it."

Paragraph 5.—The phrase "highest point" not satisfactory, the requirement should apply to the whole length of pipe, and the distance should be equal to the full diameter of the drain, and in no case be less than 6 in.

By-law 63.—Add words to define means of access—say, "by means of a manhole chamber, or vertical shaft, having a diameter of not less than that of the drain."

By-law 65.—Provision should be made for rust pocket at the bottom of the ventilating pipe.

By-law 66.—Provision should be made for anti-siphonage, and soil pipes should not be used as rain-water pipes, nor rain-water pipes for ventilation purposes.

With respect to water-closets, earth-closets, privies, ash-pits, cesspools, in connexion with buildings.

By-law 67.—The word "earth-closet" should be left out, same as in rural by-laws, and the clause amended, so that water-closets shall not open directly into any room wholly or partly used for human habitation, or, as a place of habitual employment for any person in any manufacture, trade, or business.

By-law 68.—Windows are not necessary for outside water-closets wholly detached from the building, proper ventilation can be obtained by cutting the doors.

By-law 69.—The following words should be added after "adequate capacity," "capable of giving a flush of not less than two gallons." Committee suggest that a three-gallon flush should be provided for.

By-laws 70 to 91.—Dealing with ash-pits, privies, and cesspools, the rural model should be adopted instead of the urban, and, as regards ash-pits, the committee suggest a by-law to provide for ash-bins, and recommend that permanent ash-pits be done away with.

There are many by-laws not provided for in the model code, although they are usually to be found in most urban codes, and it would be an advantage if they were included in the model, and many towns have, under private Acts, very useful by-laws which should not be lost sight of in framing a new Building Act.

As to Giving of Notices, Deposit of Plans, etc.—As regards the deposit of plans of new buildings, and alterations to existing buildings, proper plans giving the different floors, sections, block plan showing drainage, etc., should be compulsory in all districts, and they should be deposited on tracing linen, or other suitable and durable material other than tracing paper.

In recent discussions on this subject, many speakers have suggested that no plan was necessary, especially in rural districts; this, in the opinion of the author, would be a retrograde step. How would it be possible for a surveyor in a large rural district, with a limited staff, to see that the by-laws were being carried out? He would be at the mercy of the speculative or jerry builder, or liable to be called over the coals by his council for the erection of buildings which did not comply with the by-laws, owing to his lack of knowledge of the builder's intention until too late to interfere.

The author does not believe for one moment that any well-meaning landowner, or respectable firm of architects or surveyors, have any *bonâ-fide* or real objection to the deposit of such plans as we suggested. Plans

are far more necessary in rural districts than in some of the large cities and towns.

The only alternative to no plans is for the council to provide a large staff of assistants, who would constantly be perambulating the district in examining new buildings, to see that they comply with the by-laws, and would lead, in the opinion of the author, to far more disputes and criticism than the present arrangement.

If plans are disapproved on being submitted to the authority, the author quite agrees that the person depositing them should be informed in writing in what way they are wrong, or do not comply with the by-laws, and so avoid unnecessary friction and annoyance.

Considering the thousands, tens of thousands, or probably, more than hundreds of thousands of plans of buildings which pass through the hands of, and have to be supervised by, the officials of local authorities every year, the small amount of friction which arises is to be wondered at, considering the complex subjects to be dealt with; and it should not be assumed, from the comparatively few cases which come into court, that friction is continually taking place between those responsible for carrying out by-laws and those engaged in the erection of buildings; such is not the case.

In the discussions that have taken place of late, the point has been raised, what is a new building? If the following clause, granted in many private Acts, was adopted in a general Act or building code, much of the difficulty would be removed:—

"From and after the passing of this Act:—The erection of any building; the re-erection, wholly or partially, on the same site of any building, of which any outer wall is pulled down to or within 10 ft. of the surface of the adjoining ground, and of any frame building so far pulled down as to leave only the framework of the ground floor story thereof; the conversion into, or using as, a dwelling-house, of any building, or part of a building, not originally constructed for human habitation; the conversion into one dwelling-house of two or more dwelling-houses, constructed originally as one dwelling-house; the conversion into, or using as, two or more dwelling-houses, of any building constructed originally as one dwelling-house; the conversion of a building which, when originally erected, was legally exempt from the operation of any building by-laws in force within the borough, into a building which, had it been originally erected in its converted form, would have been within the operation of those by-laws; the re-conversion into, or using as, a dwelling-house of any building which has been discontinued as, or appropriated for any purpose other than, a dwelling-house; the conversion into a dwelling-room of any room, or part of a room, used as a shop; the making of any addition to an existing building by raising any part thereof, or making any projection therefrom, but so far as regards such addition only; and the roofing or covering over of an open space between walls or buildings, shall, for all purposes of this part of this Act and of the Public Health Acts, and of any by-law made thereunder respectively, be deemed to be the erection of a 'new building.'"

A great deal has of late been said as regards the competency or otherwise of those responsible for administering the by-laws, whether they be the disinterested gentlemen who serve their less fortunate fellow ratepayers or the much-abused officials.

As regards the former, the opinion has very freely been expressed that the members of local authorities are actuated by a desire to do their duty in the best manner according to their ability; it is a well-known fact that applies to all districts, be they town or rural, that there is great difficulty in obtaining many of the best members of the community to come forward and give their services freely for the benefit of the many; possibly there is a lack of interest in the work, or apathy for the consideration of others; someone must, therefore, perform what possibly others are better able to carry out.

With reference to the latter gentlemen, this is a matter, after all, which is entirely in the hands of the general public, if the Acts of Parliament and by-laws of the country are to be administered by competent men, and there cannot be two opinions as to the desirability of this.

All officials of local authorities should be appointed subject to the sanction of the Local Government Board, the same as Poor Law officers, and the question of security of tenure and superannuation, of which we have heard so much of late, should be given to all.

Whilst one regrets to hear that there are in some of the smaller districts incompetent officials, one does not have very far to look for the root of the evil; it lies in the miserably small salary offered for the duties of the office, a salary in many cases less than that paid by many of us to our foremen. The reason of this may be that the town cannot afford an adequate salary; if that is so, the author suggests that larger districts should be formed, so that competent men may be engaged at a reasonable salary, and that they should devote their whole time to the duties of their office. Districts might be grouped together for this purpose, as is done for sanitary purposes in many parts of the country.

The author suggests that the present building by-laws should be remodelled, or a universal Building Act adopted, which should be compulsory, and power should be given to each district, subject to the sanction of the Local Government Board, to frame regulations as to the minimum size and strength of material to be used in the construction of buildings, drainage, and other particulars. They should be concise, deal consecutively with the various subjects, follow the same order in which they usually have to be dealt with in building operations, be provided with a full index, marginal notes, explanatory illustrations, and diagrams. In framing these regulations greater latitude should be given to each district, making them vary, according to the requirements of each particular district, they would not then be so cumbersome and unnecessarily lengthy. At the same time definite rules should be laid down, as it would be dangerous to make them too elastic, or they would not be properly enforced.

It would no doubt be necessary in order to provide for some of the by-laws as herein referred to both for urban and rural districts for the Local Government Board to obtain further powers.

Power might also be given to charge fees for the supervision of all buildings on the same lines as is done in London under the Building Acts, and several other towns under private Acts.

In the recent discussions that have taken place it has been suggested that the Institute of British Architects and the Surveyors' Institution could frame such a Code of By-laws as would be acceptable to the Local Government Board, the architects, building owners, and the general public.

The author is of opinion that in the event of experts being asked for further suggestions for the proposed Building Act or amended by-laws, the members of this Association should be consulted in a matter in which they are so deeply interested, as no association is more competent or better able to assist in this matter.

In conclusion, the author has endeavoured to keep clear of the points covered by previous papers, and wishes to express his thanks to those who have so kindly lent him various pamphlets, journals of other associations, reports, by-laws, etc., and, also, how much he appreciates the valuable assistance rendered by his colleagues, both members of the Council and those co-opted in the work of the By-laws Committee. A great deal of time has been spent in considering the details of each by-law by that Committee, and whilst the author has here only referred to the more important alterations, at the same time, there are many minor amendments and suggestions which can be brought forward when the matter is finally discussed, or a revision takes place.

THE GLASS TRADE IN THE DAYS OF QUEEN ANNE.

"NEVE'S Builder's Guide," published in the early years of the XVIIIth century, gives us particulars of the glass trade in the reign of Queen Anne. We read that there were then manufactories of glass in Ratcliffe, Lambeth, Woolwich, Bristol, Staffordshire, and Newcastle-on-Tyne. The Ratcliffe glass before 1691 had been made at the Bear-garden on the Thames. It had the peculiarity of a light blue tinge that was very distinct when placed on white paper. It was then sold for about 9d. per ft., cut into squares ready for use. When set up in its place the cost amounted to about 18d. per ft.

The Lambeth glass had a darker tint, inclining to green. It was sold in London for about 8d. per ft., cut into squares, and when set up in windows with lead was charged about 16d. per ft. The manufacture at Woolwich was but of short continuance, owing to discouragement.

Staffordshire glass had but a small sale; and that made at Bristol, though very good, was hampered with the difficulty of conveyance.

Newcastle glass had a slight ash-colour tint, and was often warped and crooked, and had specks and streaks in it. The colliers which carried coal to London afforded a good means of conveyance. It used to be said that when coals were plentiful glass was cheap, and when they were scarce the price was raised. This was sometimes 30s. per case, and sometimes 40s.

Our home manufactories had serious rivalry on the Continent. Dutch glass found its way to England, as well as that made in France and Germany. French glass, at first, was made at Cherbourg, then at Auxerre, in Burgundy, as well as at Nevers, in Orleans, and St. Gobin, in Picardy. It had a green tinge that was very apparent when laid on white paper. German glass was of two kinds, one sort being of a whitish colour, but marked with streaks or lines, and the other of a greenish tint, also subject to streaks, but not so warped as that made in Newcastle. Both were imported and sold at as low a price as Newcastle glass.

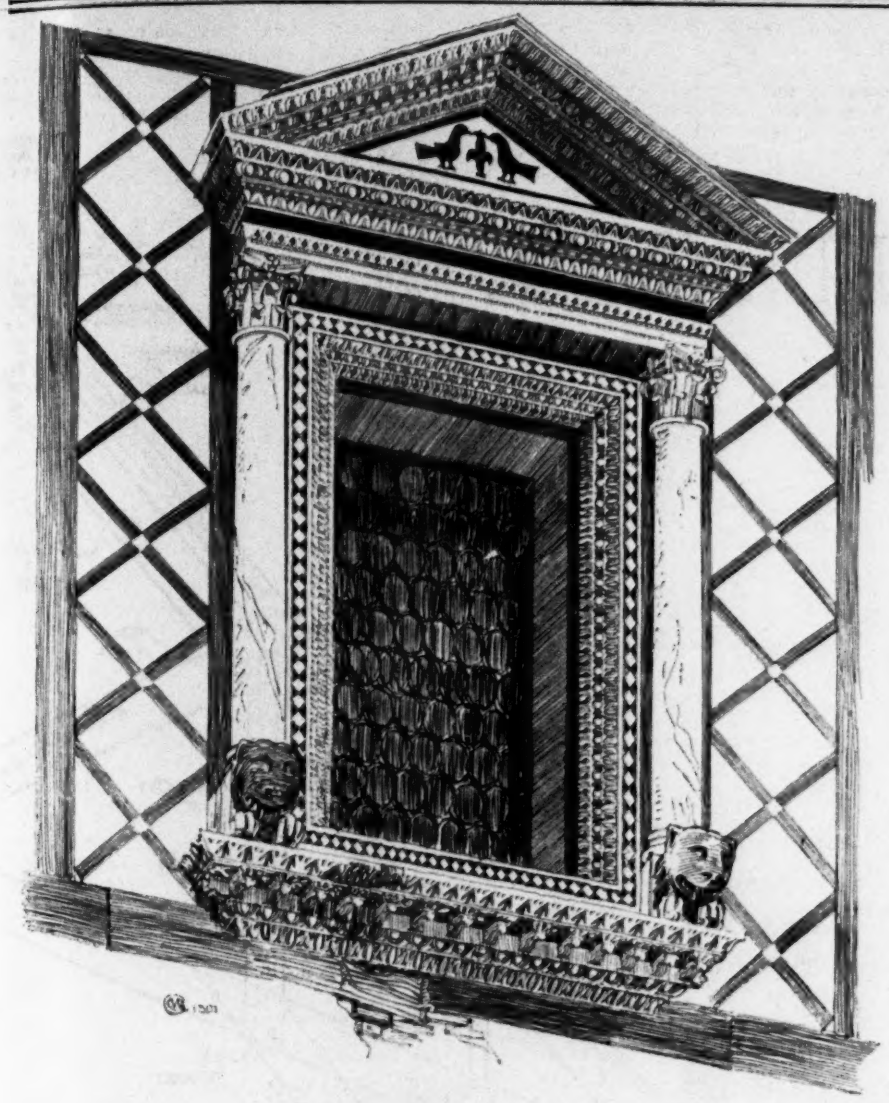
The process of cutting up a case of glass into the diamond-shaped quarries that still make the windows of some of our old manor houses and cottages so attractively picturesque involved the more minute labour of cutting some of them in halves and others in quarters and three-quarters to fill up spaces properly. The cost of this labour was from 3s. to 7s. per case. When sold in large squares the price was 22s. to 25s. per 100 ft., according to size. The cost of glazing with Newcastle glass with quarries, banding, soldering, pinning, the casements being included, was usually 5d. or 6d. per ft. in London. In some parts of the country it was a little more. In Rutlandshire and some of the northern counties quarries of Newcastle glass were to be had from 4d. to 5d. per ft. In some of the southern counties the price was 7d. per ft., without the extra cost of the pinning of the casements. These are prosaic details, doubtless, but they bring before us many a lovely lattice garlanded with climbing plants.

Quarries, or quarrels as they were also called, were for the most part 6 in. in length and 4 in. in width. They had other dimensions occasionally, however, of which twelve were recognised, each with their range, side-length, breadth, and area. It was not unusual to take down quarry glass, scour it, solder it anew, and set it up again. Twopence per ft. was considered a sufficient price for this process. For quarries in churches, however, there was more "banding" required. Glaziers generally allowed 50 lb. of turned lead to 100 ft. of quarry glass. In William and Mary's time (1701), sheet lead made of old lead was sold for 16s. or 17s. per cwt.

The glaziers of those days were evidently not illiterate. They could set down the dimensions of the glass they required for use in decimals; and it was a custom of the trade to make drawings of windows to be glazed, with the height, breadth, number of squares in each light, and number of lights to be fitted, with such accuracy as to secure their requirements being duly executed. In short, glazing was treated as a manual art, whereby pieces of glass, by the assistance of lead, were so fitted and compacted together by straight or curved lines as to become as suitable for its use as if it were one entire piece, and in some respects still more so, as in the case of breakage, when the damage could be repaired at a cheaper rate. James Howell tells us the "hot Venetians" he engaged to assist in the manufacture of glass in England in the XVIIth century were all gentlemen in their own country, being artists.

Looking at the numerous Queen Anne mansions passed down to us—so far removed in their associations from the days when noblemen had the glass in the windows of their castles removed when they were not in residence, and equally distant from ourselves in their staid, scholarly, reticent aspect—it is not without interest to note these scanty particulars of the glass trade at the date of their erection.

S. W.



Window, Church of San Miniato.

WINDOW, CHURCH OF S. MINIATO AT MONTE, FLORENCE.

THE window shown in this sketch is of one in the façade of San Miniato. The front has been restored from time to time. The original work dates from the XIIth to the XIIIth centuries.

Fifty Years Ago.

EXPERIMENTS WITH ELECTRIC AND OTHER LIGHTS.

EXPERIMENTS took place on the upper part of the Common at Woolwich, in the presence of a select committee, on Monday in last week, when three different kinds of lights, for war and other purposes, were tested. The first was the electric light, which was exhibited by Mr. Inglis; the second the "Drummond Light," exhibited by Sergeant R. P. Jones, of the Royal Sappers and Miners; and the third the "Bude Light," of Mr. Gurney, who also entrusted it to the care of Sergeant Jones. The electric light is reported to have appeared to possess the power of penetrating farthest into darkness, and was the most brilliant; but the Drummond also possessed some advantages. It was more portable, and could be carried by two or three men, each taking a portion of the apparatus, whereas the electric light required a waggon drawn by two horses to convey it from place to place.—*The Builder*, October 6, 1855.

CLUB PREMISES, WILLENHALL.—New premises are in course of erection in Villiers-street for the Willenhall Liberal Club. The building operations are being carried out by Messrs. Micken & Sons to the designs of Mr. Robert Law, architect.

PUBLIC LIBRARY, LEYTON.—The memorial-stone of a new public library in Leabridge-road, Leyton, was laid on the 30th ult. Mr. W. Jacques is the architect of the building, the cost of which, exclusive of furniture, will be 3,695*l.*

Illustrations.

SUNDERLAND MUNICIPAL BUILDINGS.

THIS is an addition to and reconstruction of part of the existing Municipal Buildings, and was won by Messrs. Wills & Anderson in an open competition in which Mr. McVicar Anderson was assessor.

The scheme involves the gutting of a portion of the existing buildings, forming a new top-lighted hall, round which the existing and new offices are arranged, the staircases being placed at either end of the hall. The scheme is to cost about 30,000*l.*

NOS. 27 AND 28, PALL MALL.

THIS building was erected by the Wilkinson Sword Co., Ltd., who have their showrooms, offices, board-room, etc., on the ground floor. A wide oak staircase leads from the ground floor to the basement, the front portion of which is used as a showroom. The entrance to the three floors of offices and the three floors of bachelors' chambers above is in Pall Mall, the whole now being occupied by the War Office as offices, and are served by an electric lift made by the Otis Company. All the rooms are warmed by hot water, and hot water is also provided for the lavatories.

The front is executed entirely in Portland stone, roofed with thick Westmorland green slates. The elevation to St. James's-square is in red brick and Portland stone. The red facing bricks, being 18 in. by 2 in. by 4½ in., were specially made for the work.

The contractor for the works was Mr. J. Carmichael, of Wandsworth, and Messrs. J. McCulloch & Co. executed the carving to both fronts. The whole of the work was executed from the designs, and under the superintendence, of Mr. F. E. Williams.

ROYAL ACADEMY STUDENTSHIP SKETCHES.—1903-04.

THE first sketch is of an old house in Barford St. Michael, Oxfordshire, and the building is an interesting example of English domestic architecture. The proportions are pleasing.

The west front of Peterborough Cathedral will never lack interest, as it is the finest in England. There is logic, poetry, and music in the conception, and it is not sufficiently appreciated, owing to the finish of the upper part, which is so bad that it almost ruins the beautiful idea below.

Skelton Church, York, is a splendid example of Early English (XIIIth century).

Compton Wyniates is to me the finest Tudor mansion in England. Everyone who studies domestic architecture ought to see Compton Wyniates.

Beauchamp Chapel, Warwick, was built in 1464. Although florid and over elaborate, it is suggestive.

The last sketch is of Chantry, Wells Cathedral (1489).

JAS. B. FULTON.

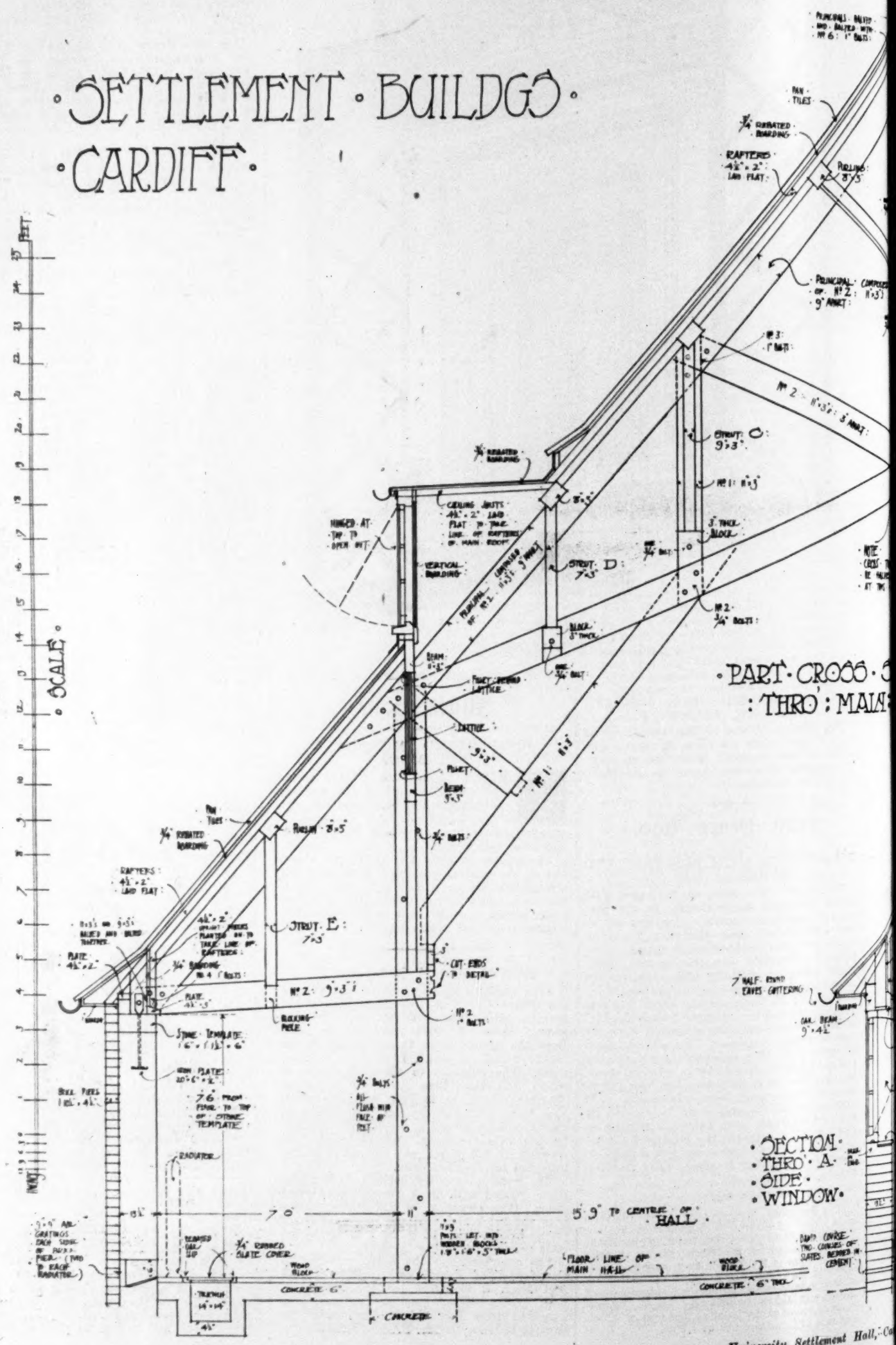
UNIVERSITY SETTLEMENT HALL, EAST MOORS, CARDIFF.

THE members of the Cardiff University Settlement have been doing very good work for some time in the dockers' quarters on the East Moors, at Cardiff. The work, however, has been much handicapped by inadequate accommodation. A generous gift by Lord Tredegar of a site, and a donation of 2,000*l.* towards the building fund by Mr. H. Wolcott Thompson (of the firm of Messrs. Spiller & Baker, of Cardiff) has made it possible for the Committee of the Settlement to commence their new buildings by the erection of a hall, which was urgently required. Complete plans have also been prepared for covering the rest of the site with the necessary buildings for properly carrying on the work of the Settlement, but these buildings cannot be proceeded with until further funds are available.

In designing the hall, the problem put before the architect was to provide a hall suitable for the various uses of a University Settlement and to accommodate a considerable number of people at a minimum of cost. The hall now built will hold, when fully seated, about 600 people. At present, with temporary stage and retiring rooms occupying the end bay of the hall, it holds 450. The total cost of the structural work has been about 1,800*l.* The stage and retiring-rooms adjoining the same have not yet been erected. The sum above mentioned represents the cost of the hall with the temporary stage erected at the end. It, however, also covers the cost of putting in a drainage system which will be available for the complete scheme and which has been connected to the town's sewers. The hall had to be planned in the

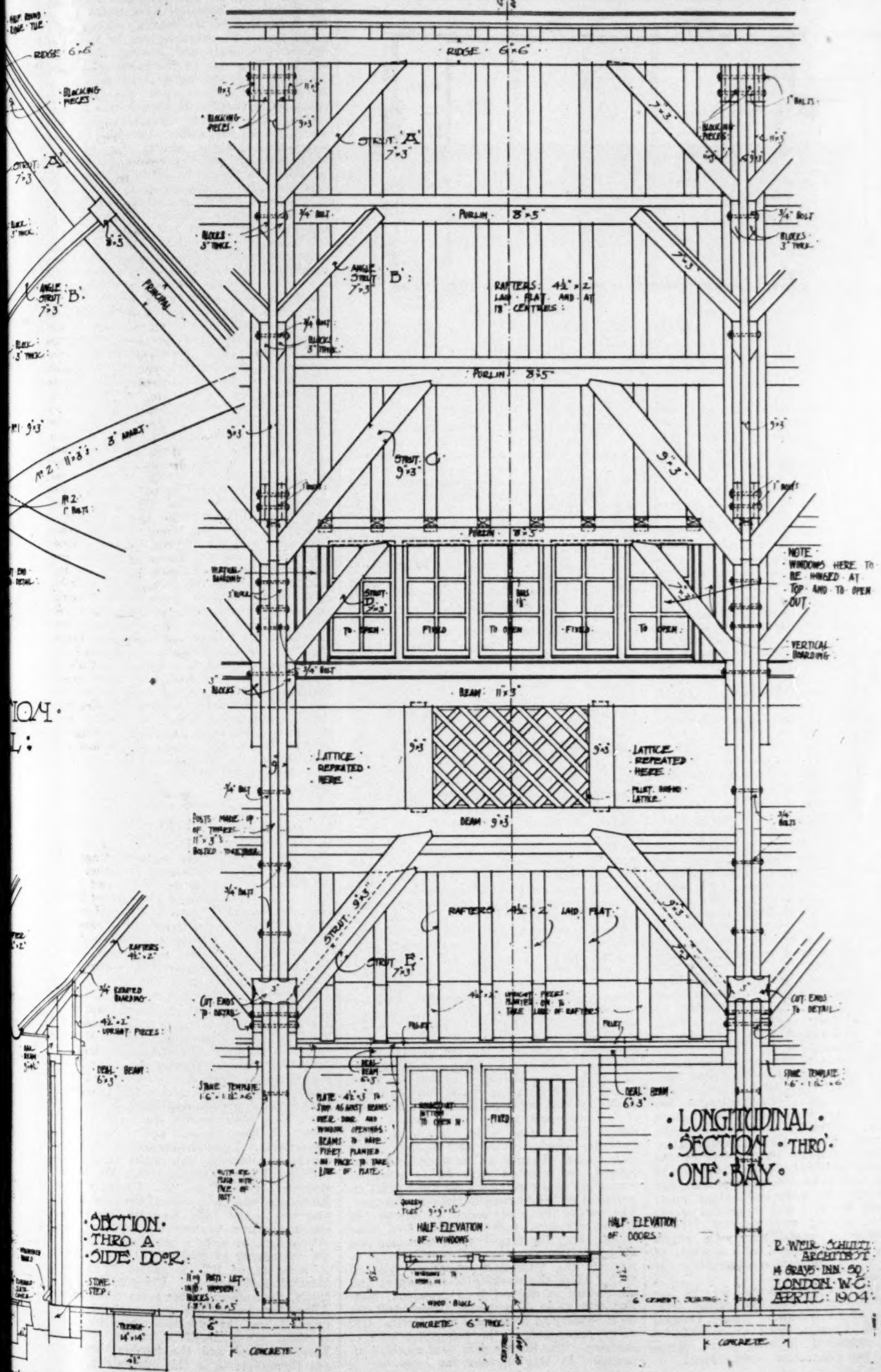
Finial, University Settlement Hall, Cardiff.

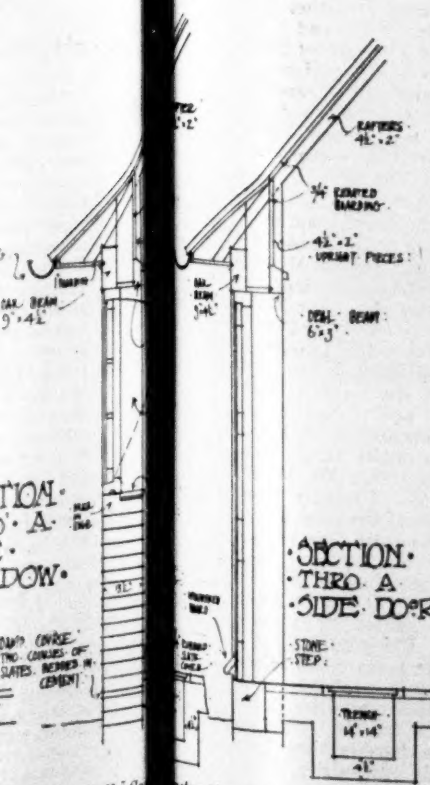
SETTLEMENT BUILDGS CARDIFF



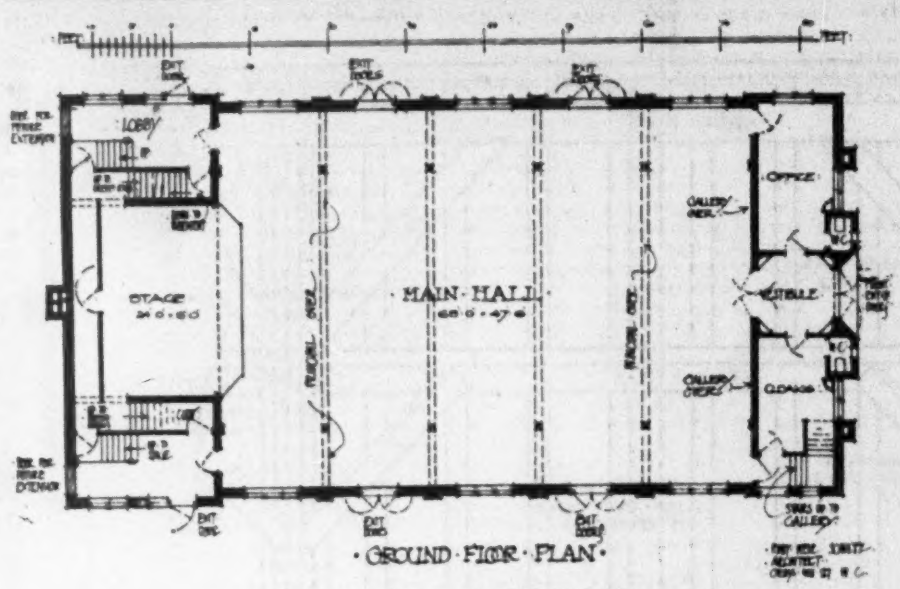
University Settlement Hall, Ca

SHEET No 5.


RIDGE 6"×6"
STRUT 'A' 7"×3"
PURLIN 8"×5"
ANGLE STRUT 'B' 7"×3"
RAFTERS 4½"×2" LAID FLAT AND AT 18" CENTRES
STRUT 'C' 9"×3"
STRUT 'D' 9"×3"
BEAM 11"×3"
LATTICE REPEATED HERE
BEAM 9"×3"
STRUT 9"×3"
STRUT 'E' 7"×3"
RAFTERS 4½"×2" LAID FLAT
NOTE WINDOWS HERE TO BE HINGED AT TOP AND TO OPEN OUT
VERTICAL BOARDING
CONCRETE 6" THICK
CONCRETE
LONGITUDINAL SECTION THRO' ONE BAY
HALF ELEVATION OF WINDOWS
HALF ELEVATION OF DOORS
R. WEIR SCHULTZ ARCHITECT 14 GRAYS INN SQ. LONDON W.C. APRIL 1904



Settlement Hall, Co... Constructional Details of Roof.



University Settlement Hall, Cardiff.

simplest and most economical way, and there was no margin available for any elaborate detail, which, indeed, is not required in a building of this kind. The walls are built of red bricks from Bridgwater, pointed outside and in; the roof is all of deal, constructed out of ordinary scantlings in as simple a manner as possible. It is covered with boarding felt and Bridgwater pan tiles. The floor of the hall is laid with deal-wood blocks. At present the hall is heated by two temporary iron stoves.

The panel in the front gable was modelled and presented to the Settlement by Mr. W. Goscombe John, A.R.A.

The hall is lighted by electricity, the installation having been carried out and presented as a free gift to the Settlement by Mr. Herbert Edwards, electrical engineer, of the firm of Messrs. Edwards & Armstrong, Cardiff and Bristol.

Messrs. W. Thomas & Co., of Cardiff, were the contractors, and Mr. Alfred Richards, of Cardiff, acted as clerk of works. The architect is Mr. Robert Weir Schultz (London).

MEMORIAL BAPTISTRY, BUCKLEY CHURCH.

ST. MATTHEW'S, Buckley, in the neighbourhood of Hawarden, built some eighty years ago as one of the several then dependent churches of that extensive parish, has during the incumbency and through the instrumentality of Canon Drew been completely remodelled. The nave, with aisles added, has been entirely rebuilt, and a new chancel in memory of the Right Hon. W. E. Gladstone erected, this having been followed by the forming of a baptistry at the west end in the tower as a memorial of Mrs. Gladstone.

Portland stone and black marble have been used for the pavement, and St. Bees stone for the font; over this is suspended an octagonal oak cover carved and traceried, having as a background a stained-glass window by Mr. H. Holiday.

Above the wood panelling, stained green, the surface of wall and ceiling has been treated in colour, wax medium being employed. The scheme of the decoration has reference, in the lower and upper parts respectively, to the initiatory and complementary rites of baptism and confirmation. Surmounting the dado, the emblem of the net enclosing enfolded fishes is introduced as a band with a label bearing a text, and rising from this are stems and leafage, interspersed with the dove and crown and sacred monograms, leading and growing into a frieze containing medallions, with angels supporting shields charged with symbols of the seven-fold endowment enumerated in the confirmation office.

The decoration was executed by the late Mr. W. F. Lodge, of West Hampstead, from the designs of the architects, Messrs. Douglas & Minshull, Chester, from whose coloured drawing, exhibited in this year's Royal Academy, our illustration is reproduced.

ENGINEERING SOCIETIES.

THE INSTITUTION OF CIVIL ENGINEERS.—The Council of the Institution of Civil Engineers have, in addition to the medals and prizes given for communications discussed at the meetings of the Institution in the last session, made the following awards in respect of other papers dealt with in 1904-5:—A George Stephenson medal to Capt. H. R. Sankey, R.E. (retired), (London); a Watt medal to Dr. C. Chree, F.R.S. (Richmond); Telford premiums to Messrs. W. E. W. Millington (Oldham), C. E. Stromeyer (Manchester), C. W. Hill (London), F. C. Lea (London), W. B. Cole (London), W. C. Popplewell, M.Sc. (Stockport), E. H. Rigby, B.Sc. (Tientsin), and W. O. Leitch, jun. (Tientsin). For students' papers the awards are:—Miller prizes to Messrs. A. B. Potts (Macclesfield), W. M. Hayman (Glasgow), R. E. Bury (Calcutta), T. Lees, jun. (Winnipeg), T. L. Matthews (London), P. J. Risdon (London), F. E. Tudor (Stevenage).

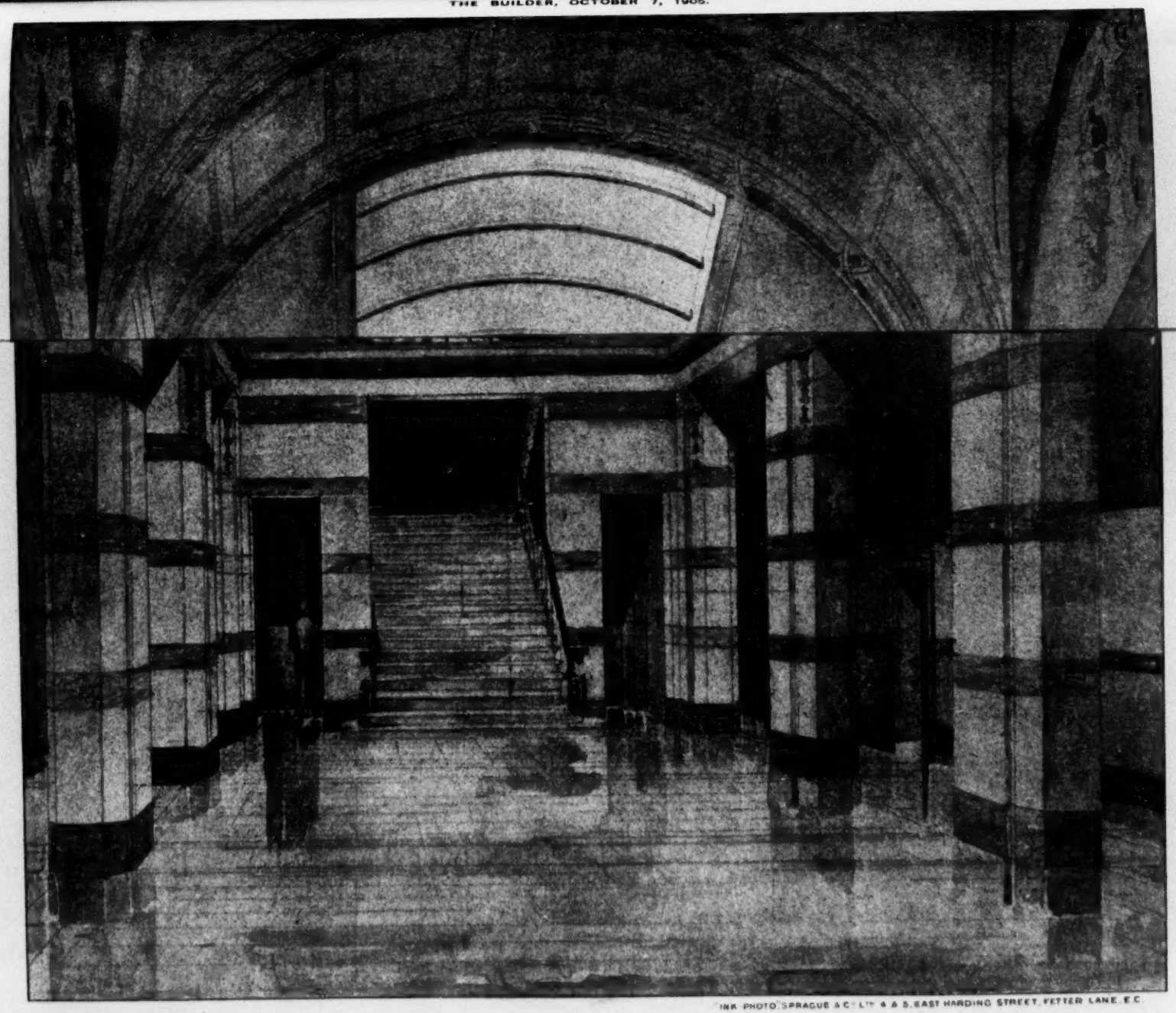
THE SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers held at the Royal United Service Institution, Whitehall, on Monday evening, Mr. Maurice Wilson, Vice-President, in the chair, a paper was read on "Machine Drills for Hard Rock," by Mr. Arthur H. Smith, A.M.Inst.M. and M.E., of which the following is an abstract:—The author first pointed out the immense importance of the subject to mining, civil, and quarry engineers, setting forth the great services the rock drill had rendered in metalliferous mining and quarrying, and instancing some undertakings which would never have reached completion, and others which probably would not have been commenced, without the aid of machine boring. The history of rock drills was next outlined from Trevithick's machine to the steam percussion hammer introduced by Nasmyth, and its subsequent development for boring purposes by the Couch and Fowle patents, which included reciprocation and rotation, and were the direct forerunners of the present standard rock drill of a dozen first-class makers. The author then proceeded to describe hand drills, the first being driven by a crank handle, the blow being effected by the recoil of a compressed spring. The second is a device for grasping a bit, which is automatically lifted, rotated, and replaced after each stroke. Passing on to steam and compressed air actuated rock drills, attention was called to a compressed air hand drill, an evolution of the pneumatic chipping hammer. The author next proceeded to divide the present standard rock drill into two main classes—viz., the tappet valve type and the fluid moved valve type, mentioning, *en passant*, the Darlington valveless type of 1873. After the working of the tappet and air thrown valves had been explained, mention was made of a special tappet drill for 40 ft. quarrying holes, also of a Corliss drill valve gear, and of the compound type of machine. The Leyner drill next received attention. In this machine the loose tool is struck by a moving piston. Turning to electric drills, the two principles made use of in their construction were stated to be the conversion of the rotating motion of a motor into a reciprocating one by means of flexible live shaft and gearing, the actual striking being due to the recoil of a compressed spring, the second type deriving its reciprocating motion from the attractive power of solenoid coils upon a loose core or piston. The Brandt hydraulic drill was next noticed, the author describing it as a large hollow auger pushed forward with heavy pressure, and slowly rotated. He then referred to a novelty in the form of an internal-combustion motor-driven drill, operated by gasoline. Drill mountings and fittings were subsequently discussed, the author dealing with drill clamps, and incidentally with the question of "nicking" and "shearing" with special clamp arrangements. The author then observed that no paper on rock drills could be complete without a reference to miners' phthisis, considering the finding of the recent Royal Commission on that subject, which was appointed in consequence of the excessive mortality amongst returned Transvaal miners. The author stated that the disease was due to dust, which was effectually allayed by the Leyner and Brandt machines. He then proceeded to describe various systems of spraying and water injection attached to or incorporated with rock drills, and which had the same object in view. He then noticed the novel applications to which rock drills had been put, such as pile and bolt driving, steam hammer work, unstopping blast furnace tapping holes, and even to the flattening out of refrigerated hog bellies in America. The author concluded by reviewing the various types of rock drills and the different forms of power employed to actuate them. He emphasised the point that the business of a rock drill was not simply to cut rock, but to cut that rock as quickly as mechanically possible, and at the lowest cost, not only for actual power consumed, but also taking into consideration the relation of boring speed with its effect on capital and standing charges. For reasons which the author stated, his verdict was in favour of compressed air for actuating machine drills, and for mining work the standard compressed air rock drill arranged with an intermittent water-jet discharge at the drill point to cool the bit and to keep the cutting face clear of débris, thus insuring freedom from dust and quicker holing.

COMPETITIONS.

SCHOOL, DERBY.—At a meeting on the 2nd inst. of the Sites and Buildings Sub-committee of the Derby Education Committee it was decided to recommend that a first premium of 50*l.* and a second of 20*l.* be awarded respectively to Messrs. Hunter & Woodhouse, of Belper and Derby, and Mr. T. H. Thorpe (Wright & Thorpe), Derby, for competitive plans for a new council school on a site between Clarence-road and Porter-road.

SCHOOLS, NEWCASTLE-ON-TYNE.—At a meeting of the new schools sub-committee of the Newcastle Education Committee, the award of the assessor, Mr. Arnold Mitchell, F.R.I.B.A., in regard to the competitive plans for the proposed new schools at Bolam-street, Byker, was received. The plans placed first, second, and third in order of merit were those bearing the mottoes "Sunshine," "Open Space," and "Red Disc" respectively. Upon the opening of the sealed envelopes containing the names of the competitors, it was ascertained that Mr. W. H. Knowles, F.R.I.B.A., 27, Grainger-street, Newcastle, was the author of the plans placed first and second. Mr. Knowles thus secures the appointment to carry out the work, and, in addition, receives a premium of 30*l.* for the second set of designs ("Open Space"). A premium of 20*l.* is gained by Messrs. Marshall & Tweedy, 17, Eldon-square, Newcastle, the authors of the plans "Red Disc." Altogether twenty-five sets of plans were received, and the education committee desire to thank the competitors for the care they have exercised and the trouble they have put themselves to in this competition.

THE BUILDER, OCTOBER 7, 1905.



INK PHOTO SPRAGUE & C° LT° 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

COMPETITION DESIGN FOR SUNDERLAND MUNICIPAL BUILDINGS.—By Messrs. Wills & Anderson.

VIEW OF HALL AND STAIRCASE.

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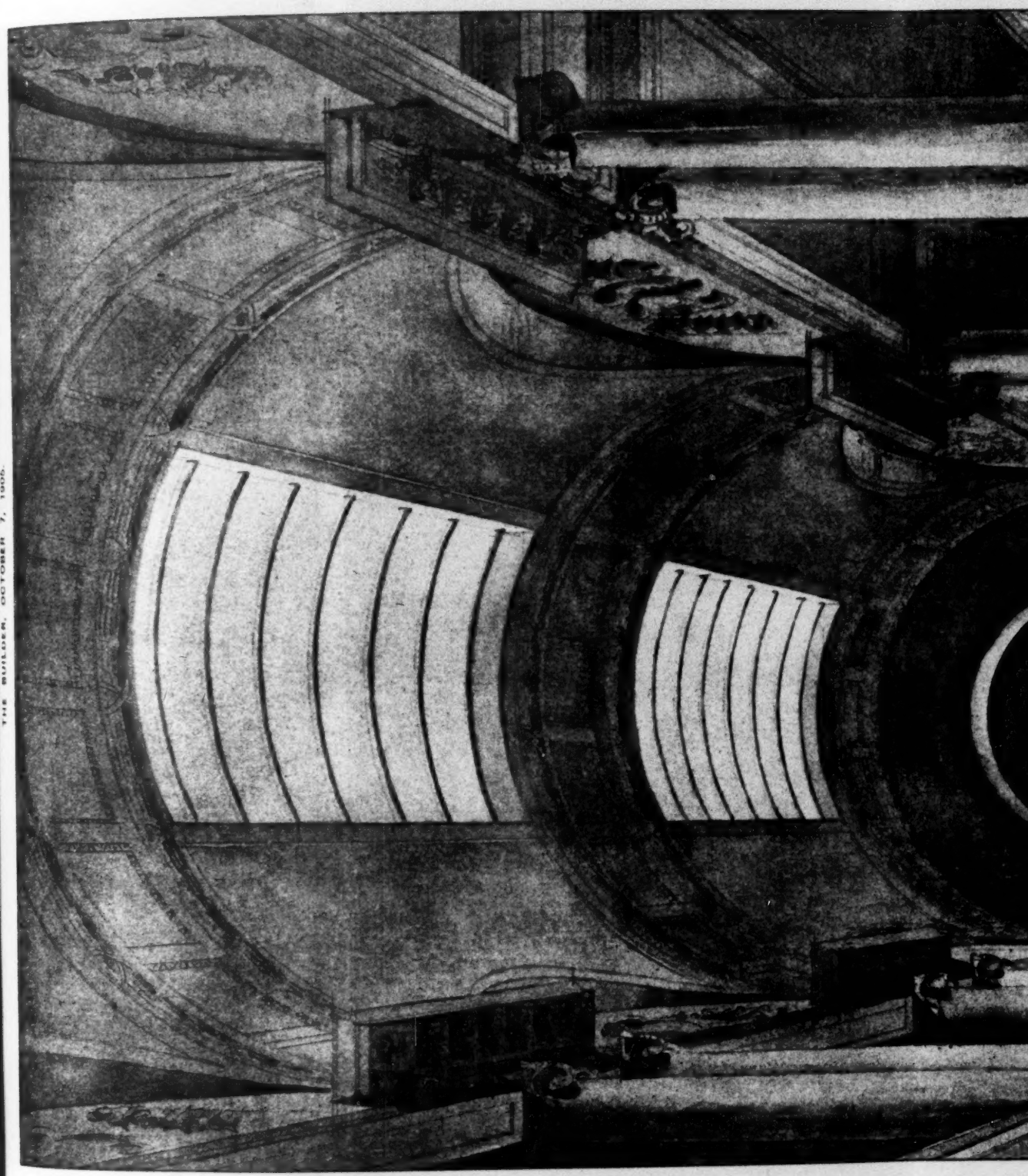
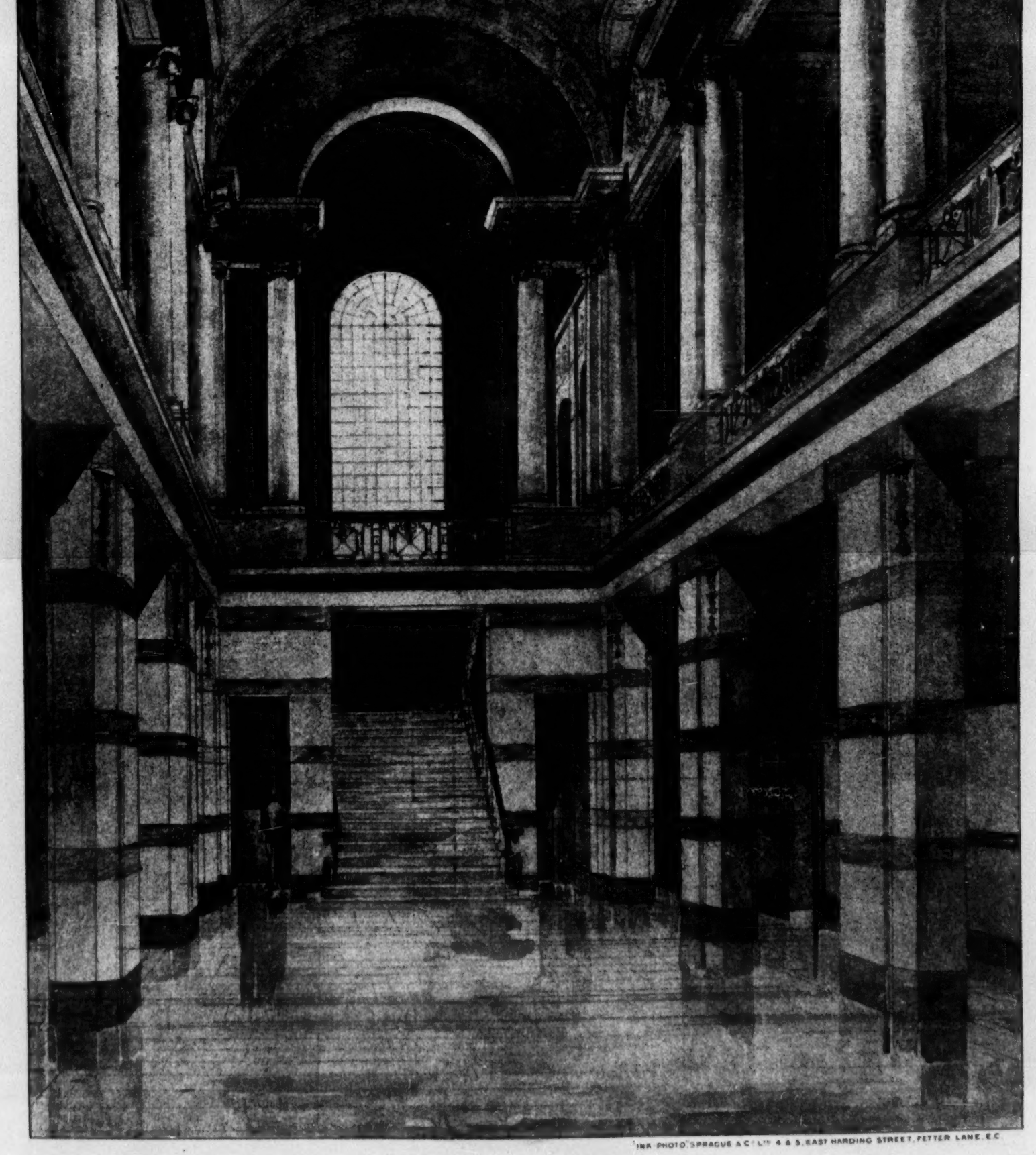


THE BUILDER, OCTOBER 7, 1905.



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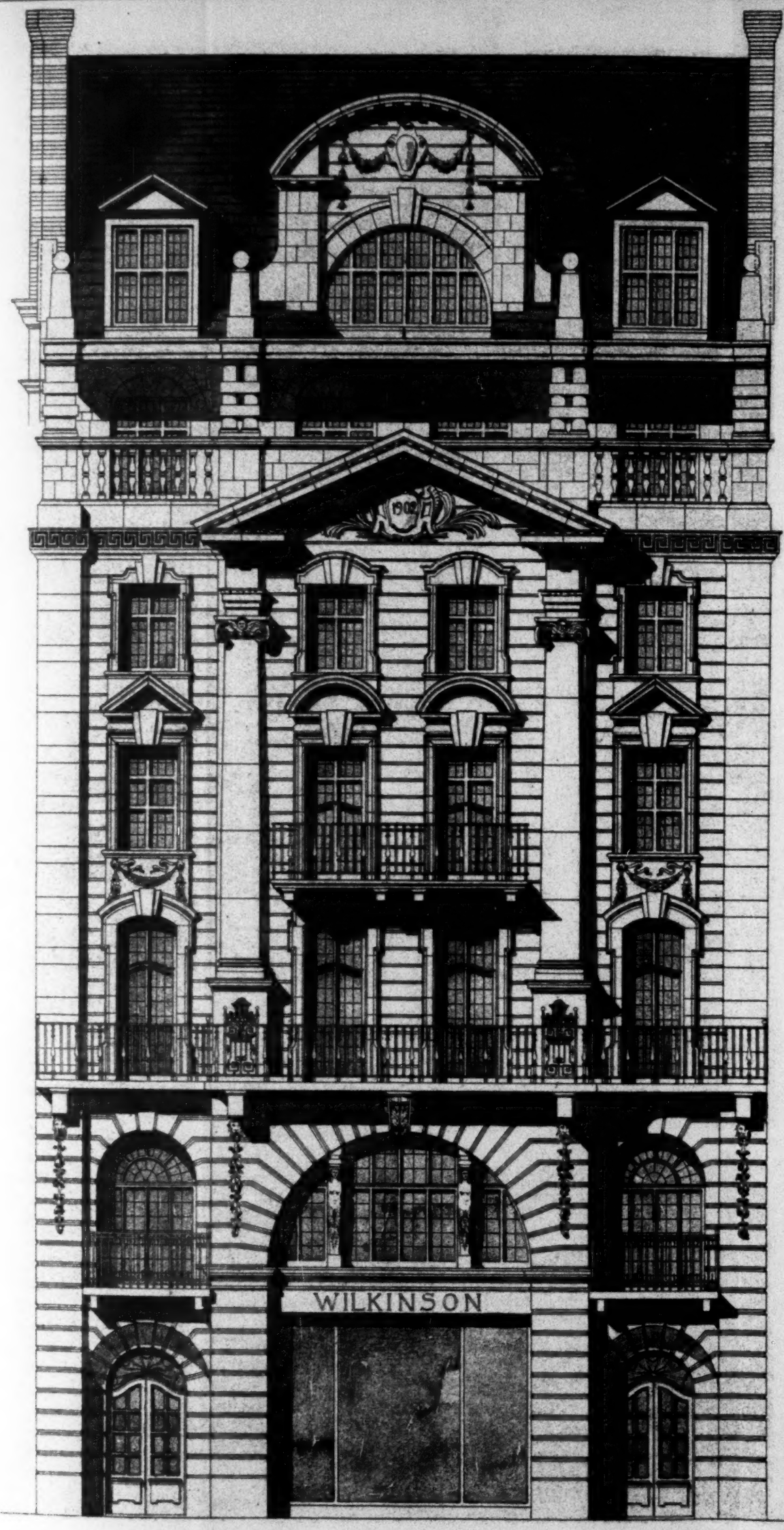
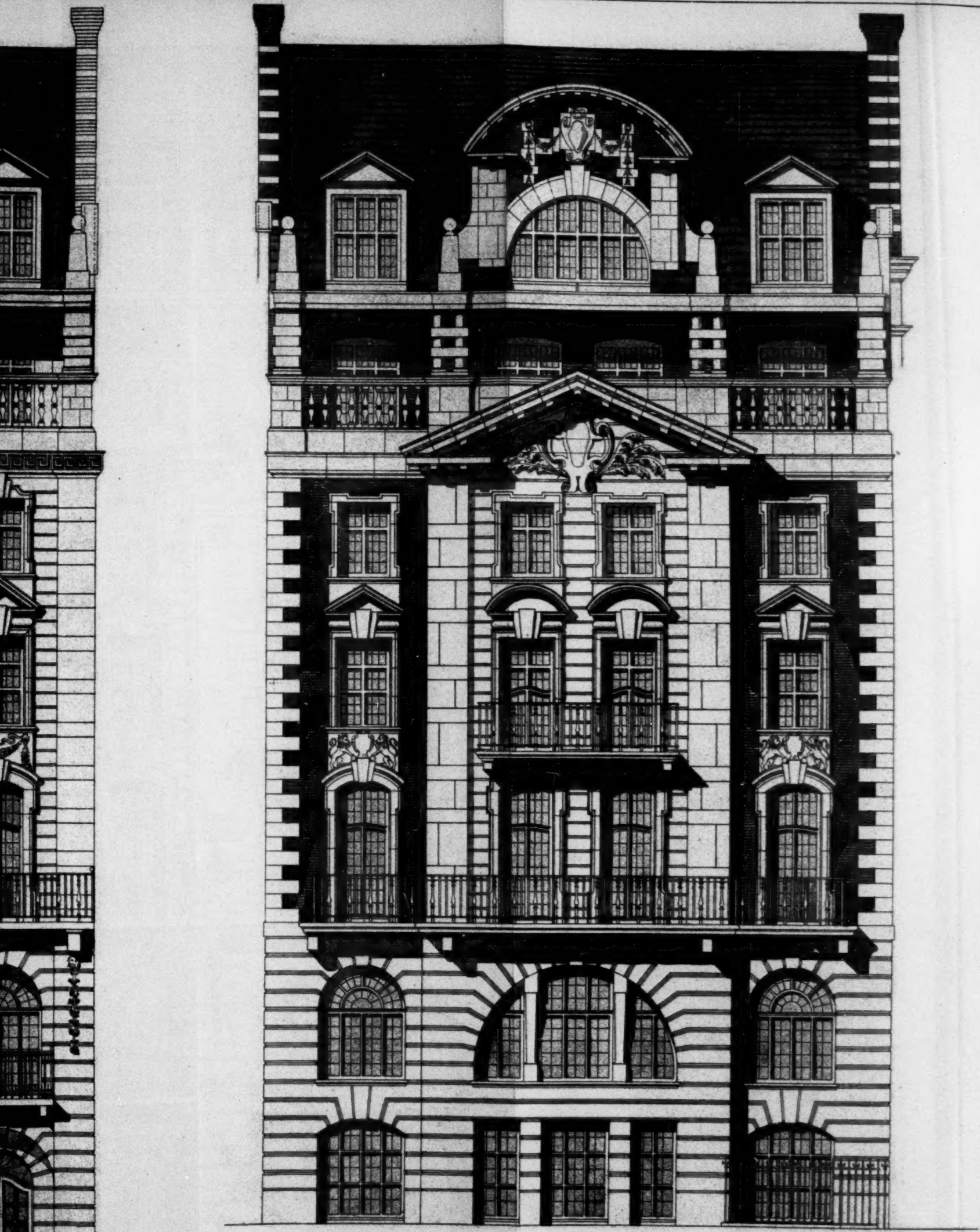
COMPETITION DESIGN FOR SUNDERLAND MUNICIPAL BUILDINGS.—By Messrs. Wills & Anderson.

VIEW OF HALL AND STAIRCASE.



FRONT, Nos. 27 & 28 PALL MALL.



ELEVATION TO ST. JAMES'S SQUARE.

Fredk. Robert Williams Archt.

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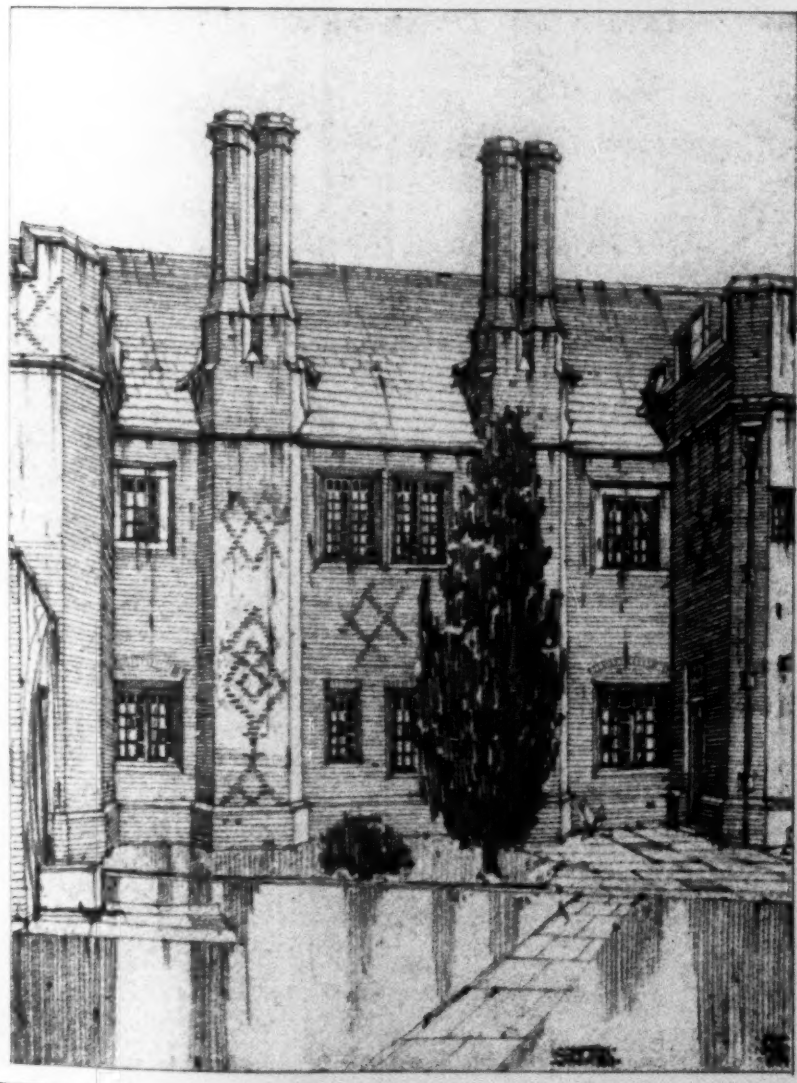

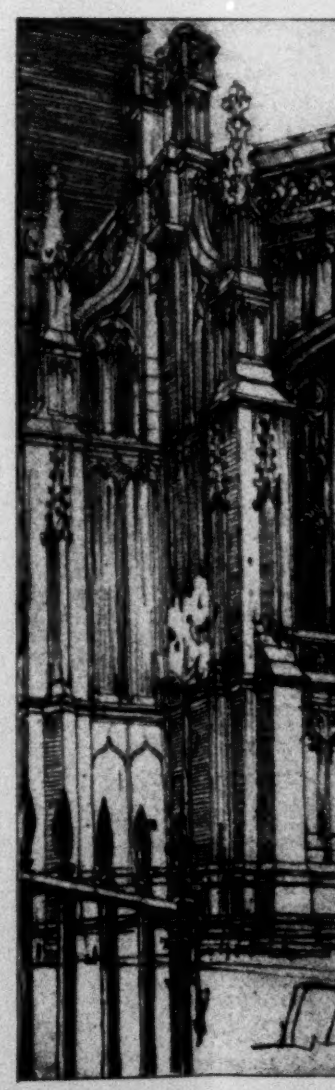

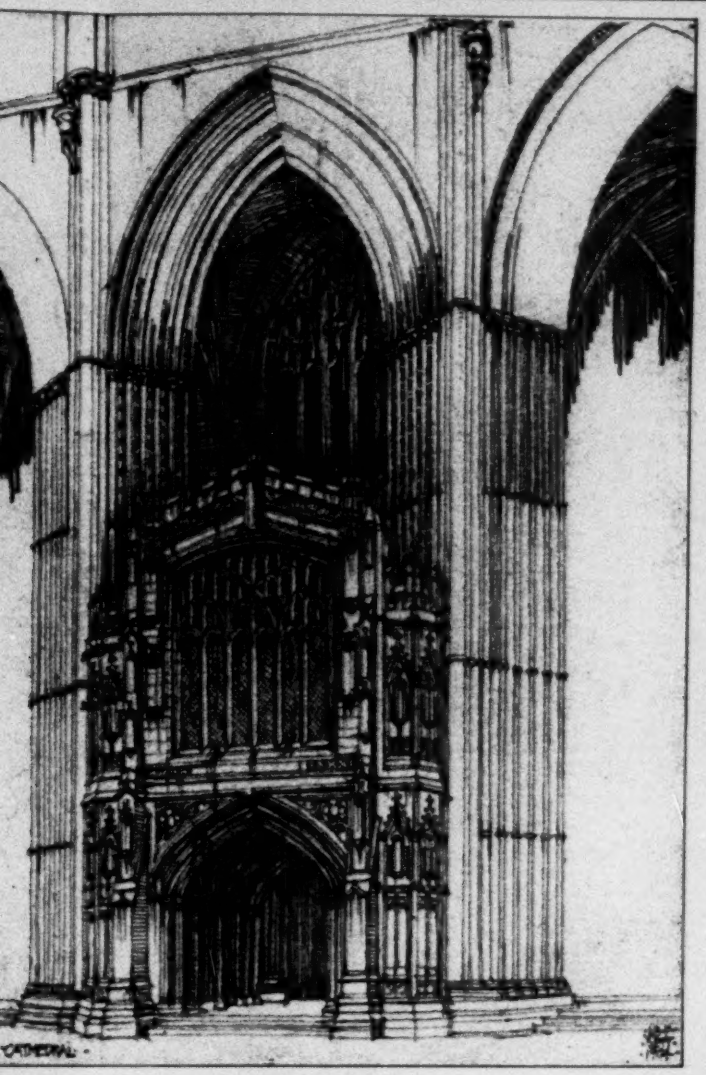

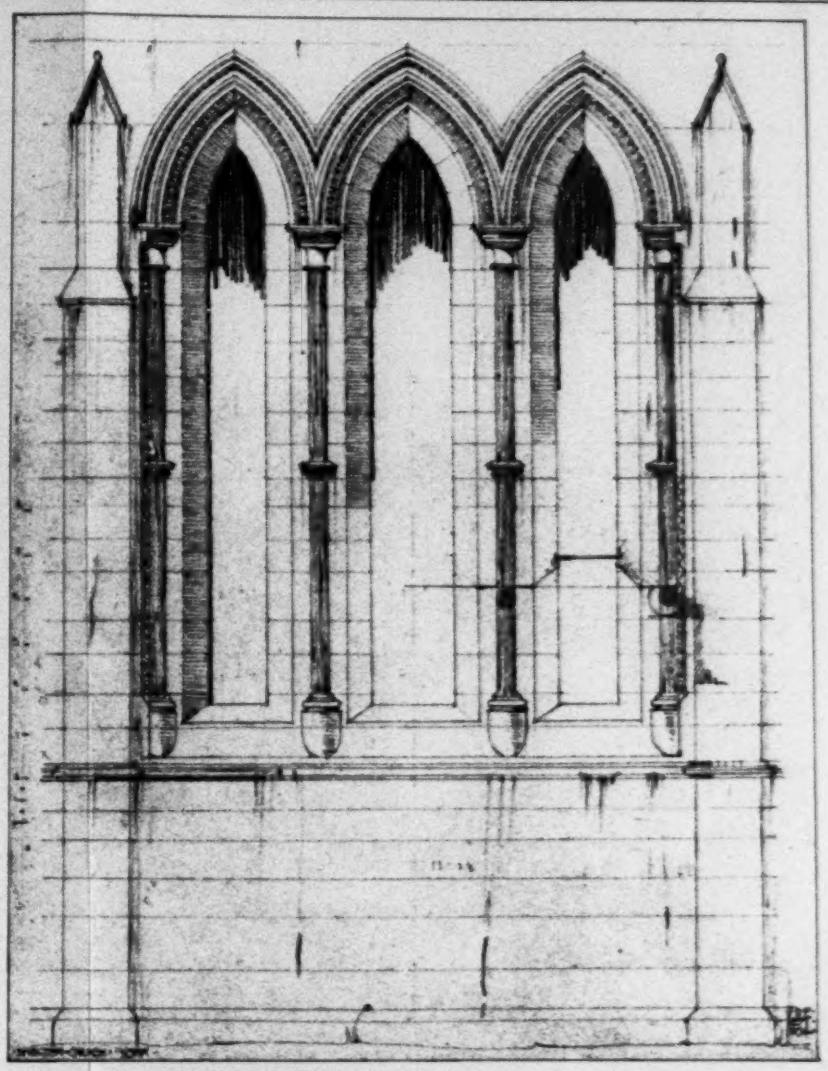

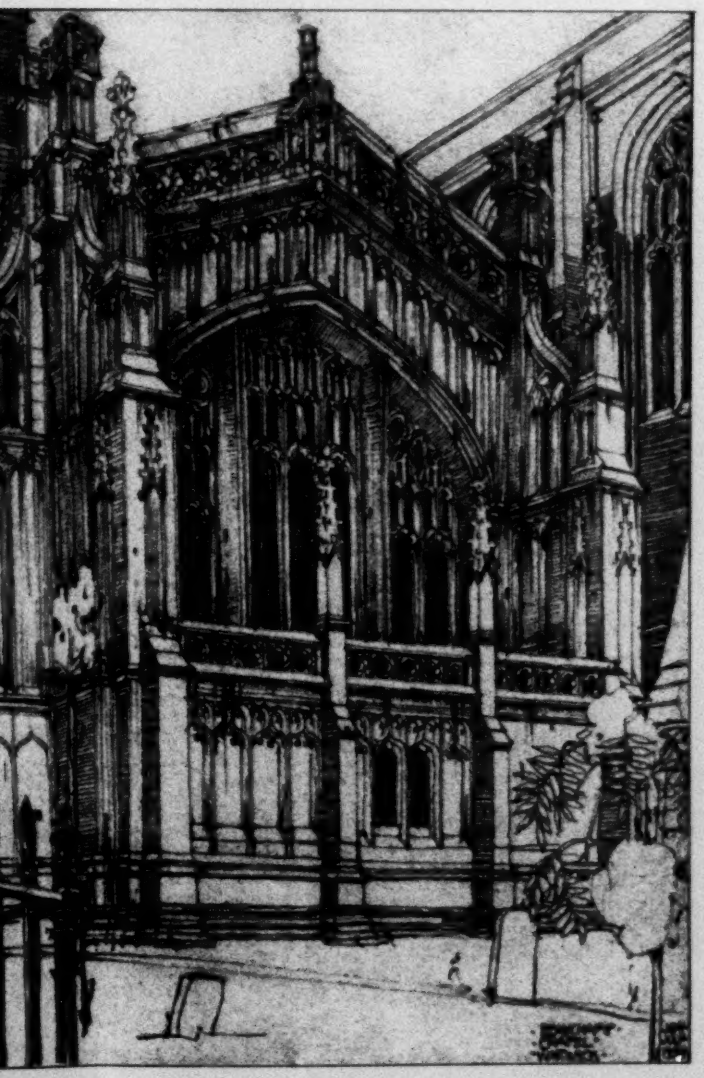

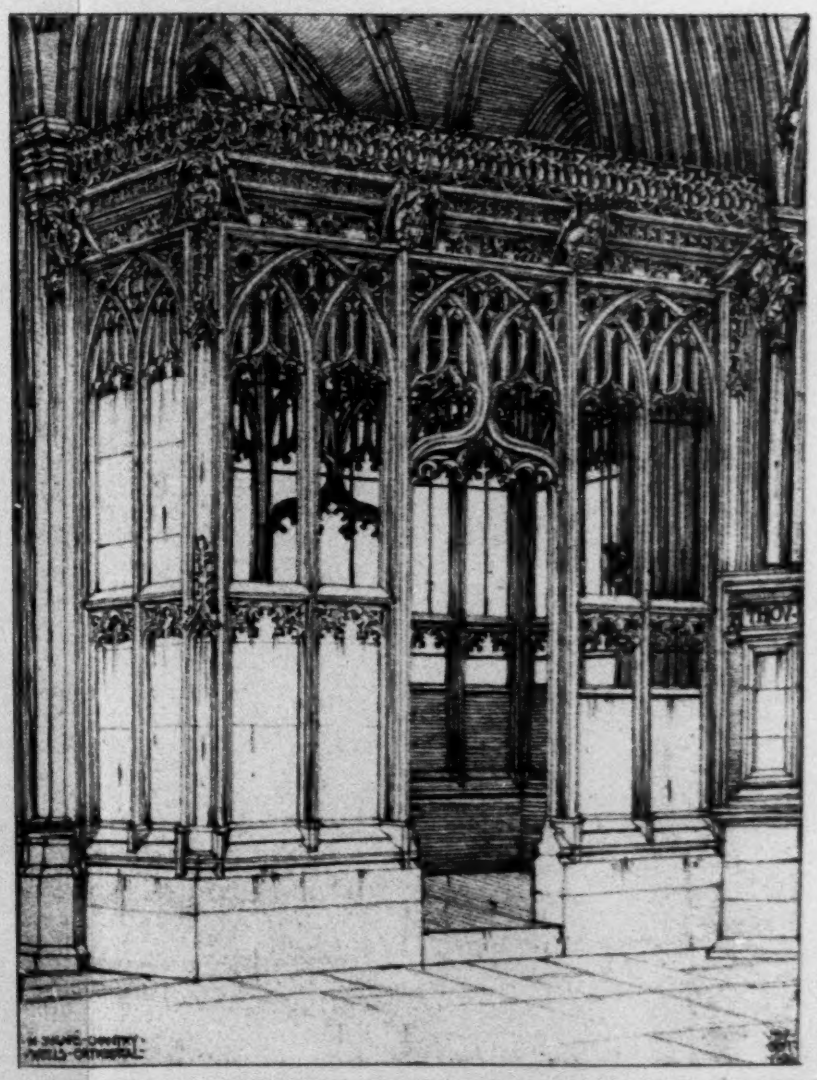

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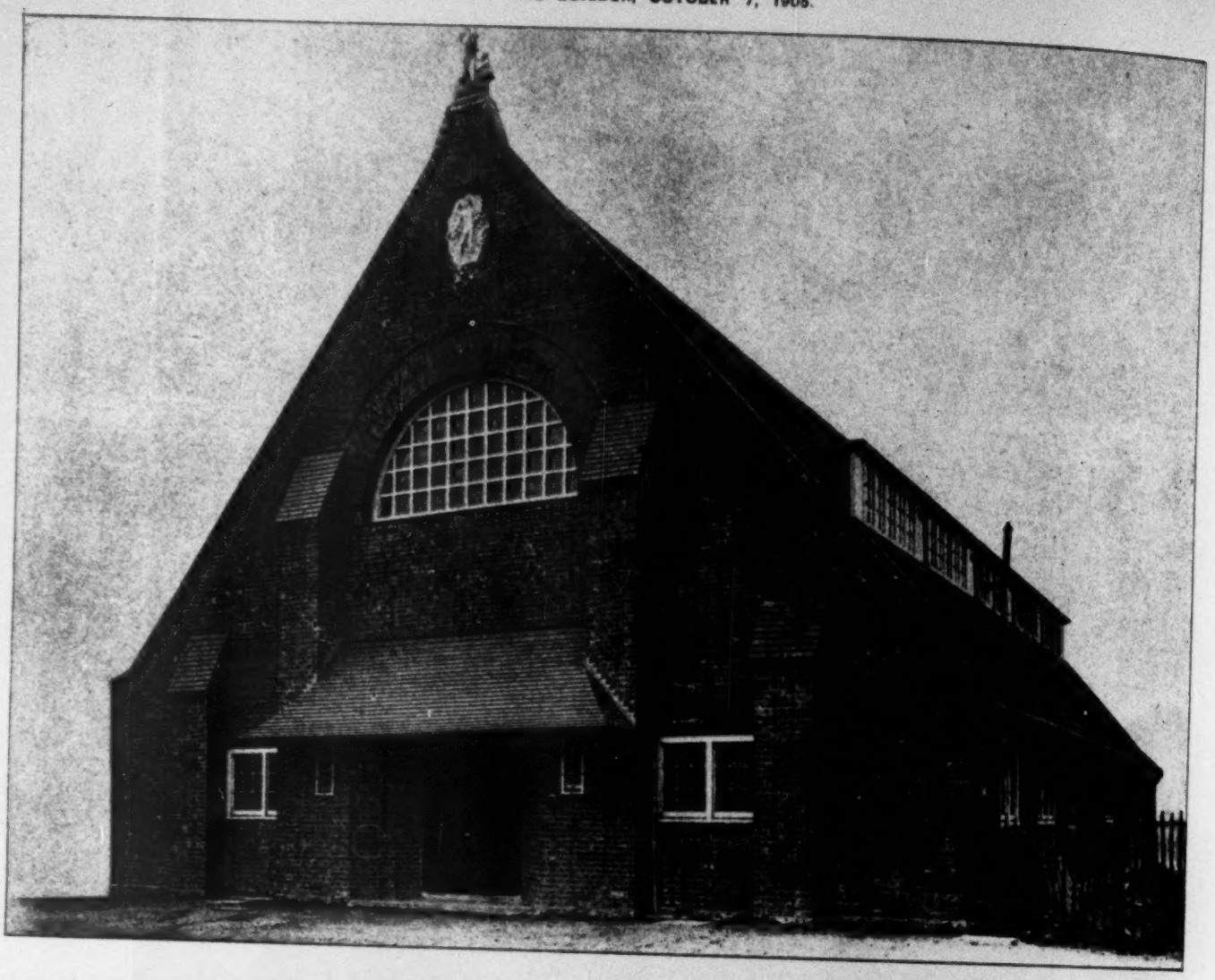
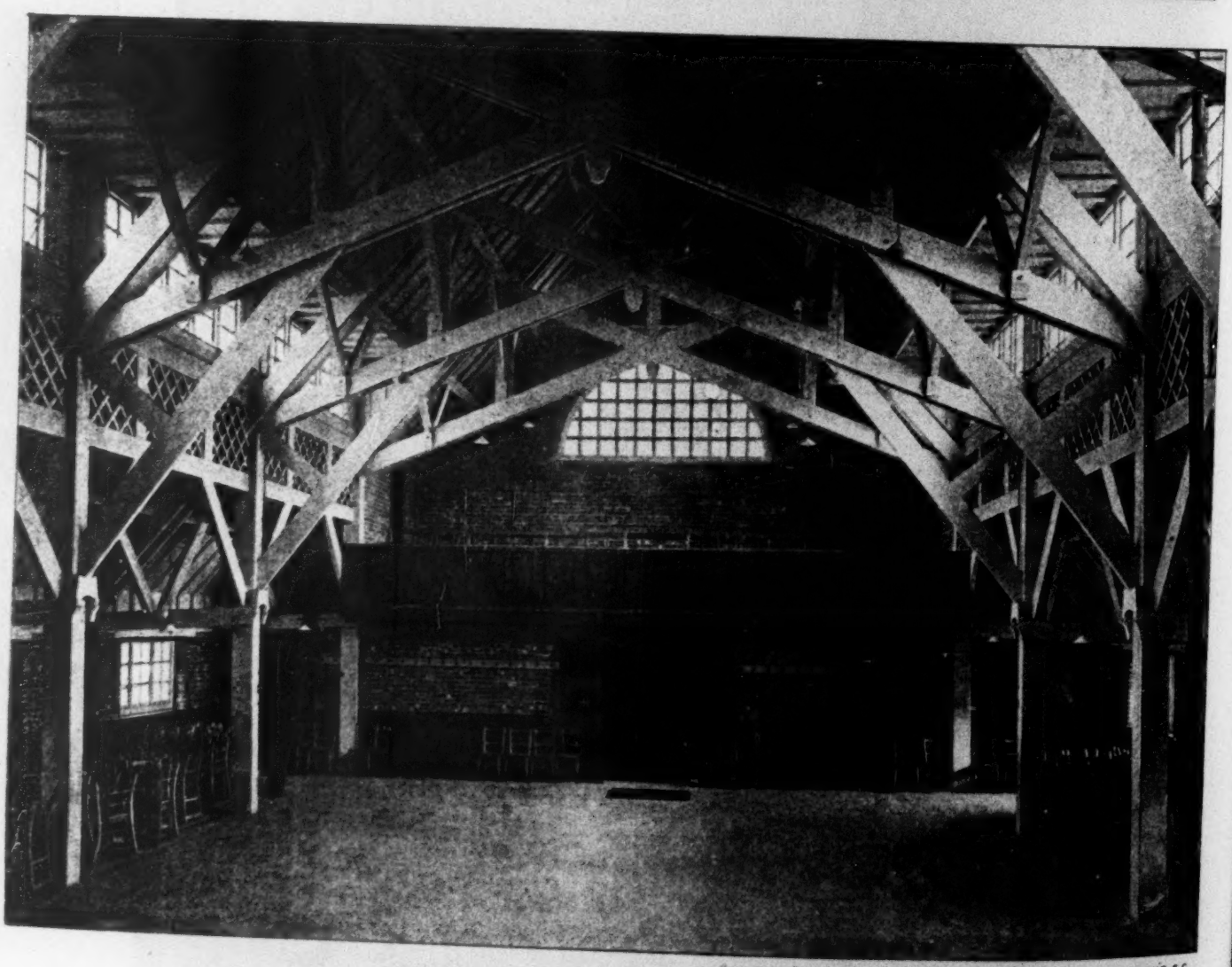
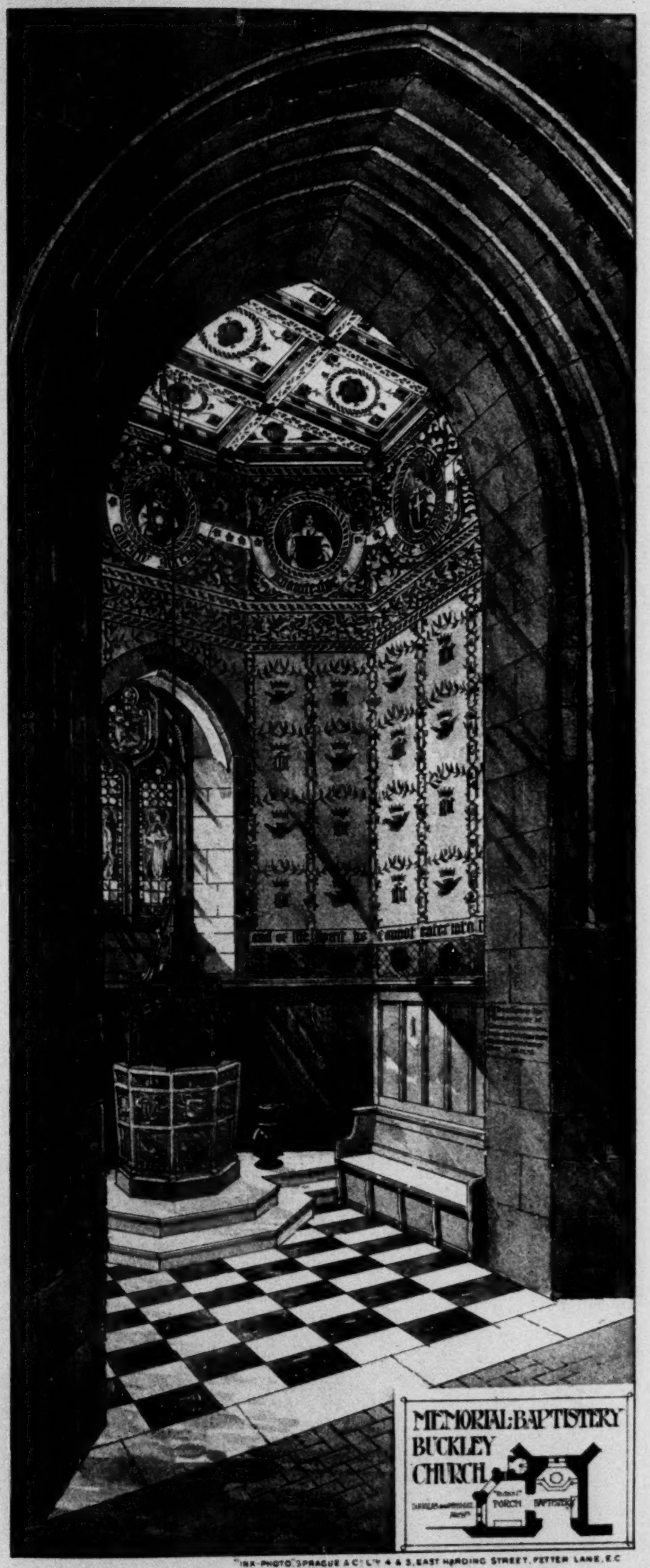
SKETCHES BY Mr. J. B. FULTON.





[INK PHOTO: SPRAGUE & CO., LTD., 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.]

UNIVERSITY SETTLEMENT HALL, EAST MOORS, CARDIFF.—Mr. R. W. Schultz, Architect.



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Books.

A Treatise on Concrete, Plain and Reinforced. By FREDERICK W. TAYLOR, M.E., and SANFORD E. THOMPSON, S.B., A.M.Am.Soc.C.E. New York: John Wiley & Sons. London: Chapman & Hall. 1905.

CONSIDERING the large number of papers read and articles written every year on the subject of concrete, and the enormous stores of information available, the task of compiling a comprehensive treatise on this valuable material of construction is exceptionally arduous. But when accomplished in the satisfactory manner evidenced by the work of Messrs. Taylor and Thompson, the result is of incalculable advantage to architects, engineers, and contractors. This treatise has been prepared in a most conscientious manner, numerous British, Continental, and American authorities have been quoted, and chapters by well-known specialists have been included. Further, twelve pages of references to articles in the technical Press are given for the benefit of those who wish to make more extended investigation than that presented in the authors' book, which, nevertheless, comprises nearly 600 pages. As a proof of their desire to avoid inaccuracies, the authors state that each chapter has been submitted for criticism to at least one, and in some cases to two, three, or four specialists, and that advance proofs have been sent for correction to authorities whose names are mentioned in the work.

Among the earlier chapters, dealing with the constituent parts of concrete, there is one by Mr. Spencer Newberry which contains a concise and practical discussion of the "Chemistry of Hydraulic Cements," and later comes one by Mr. William B. Fuller on "Proportioning Concrete"—a contribution which well deserves reading if only for the description of the author's method of proportioning the materials by mechanical analysis. This process is thus described by Mr. Fuller:—

"Mechanical analysis consists in separating the particles or grains of a sample of any material, such as broken stone, gravel, sand, or cement, into the various sizes of which it is composed, so that the material may be represented by a curve, each of whose ordinates is the percentage of the weight of the total sample which passes a sieve having holes of a diameter represented by the distance of this ordinate from the origin in the diagram.

The objects of mechanical analysis curves as applied to concrete aggregates are (1) to show graphically the sizes and relative sizes of the particles; (2) to indicate what sized particles are needed to make the aggregate more nearly perfect, and so enable the engineer to improve it by the addition or substitution of another material; and (3) to afford means for determining best proportions of different aggregates."

The practical value of Mr. Fuller's system is best demonstrated by the fact that the proportions of concrete regularly adopted by him for thin water-tight walls are about 1:3:7; while for similar constructions where the materials are proportioned by rule of thumb methods, 1:2:4, mixtures are generally necessary. Some other methods of proportioning concrete are described, and the succeeding chapter contains a diagram and several tables of quantities for concrete and mortar which will be found useful for estimating materials.

Casual examination of this volume may lead to the erroneous impression that concrete-steel is discussed only in the chapter bearing the title "Reinforced Concrete." This is by no means the case, for in that part of the book devoted to the description of typical structures, a considerable amount of information will be found relative to concrete-steel buildings and other works. A point worthy of notice in connexion with the theory of concrete-steel is suggested by the tests of Professor Turneaure, which indicate that cracks in the concrete are actually produced by tension, and that the tension load is thus transferred to the metal. Professor Turneaure tested his beams when moist and applied the load in an upward direction so that the cracks could be readily observed on the outer surface of the concrete. It should be noted that in plain concrete no cracks were observed before rupture took place. The conclusion to be drawn from these tests is that initial cracking in reinforced concrete occurs at an elongation practically the same as in plain concrete. In the case of the latter material, however, total failure takes place at once, while in the other it is a gradual process, many small cracks developing successively, so that at rupture the total elongation is considerably greater. As the authors point out, these results are somewhat at variance with the conclusion reached by M. Considère, who was not able to discover any fine cracks, and therefore drew the inference that, while the elongation of plain concrete was about 0·01 per cent., it could stretch as much as 0·02 per cent. when in combination with steel. Hence, in his formulæ for beams, M. Considère makes allowance for the resistance of concrete to tension. On the other hand, Professor Turneaure, considering that the presence of cracks seriously affects the tensile strength of the concrete, takes no account of its tensile resistance. This course is one that seems to be worthy of adoption in general practice. It should be noted that both the authorities mentioned agree as to the increased extensibility of reinforced concrete, the only point of difference being whether its tensile strength is or is not destroyed when the stress intensity surpasses that at which plain concrete is ruptured.

After discussing the principles governing the combination of steel and concrete, the action of reinforced beams under load, and the relative advantages of high and low carbon steels, the authors give a series of simple formulæ for beam and column design, as well as tables for facilitating calculation.

A chapter on the "Effect of Sea Water upon Concrete and Mortar" is contributed by M. René Feret, the Director of the Laboratory of the Ponts et Chaussées, Boulogne. This well-known expert confirms the opinion that no cement has yet been found to give absolute security against the decomposing action of sea water, but the suggestions made in his able discussion of the subject will doubtless be appreciated by dock and harbour engineers. Among other chapters of general interest are those on the effects of frost, the watertightness of concrete, and the protection of steel from fire and rust.

Several chapters are devoted to the description of concrete and concrete-steel structures; this portion of the book being quite as useful in its way as the more theoretical part by which it is preceded.

Various other ramifications of the general subject are discussed, all of them with the same conspicuous ability and painstaking care evidenced by those already mentioned. This treatise constitutes a splendid book of reference for all users of concrete, and thoroughly deserves to have a large sale both in this country and in the United States.

Standard Steel Construction. Compiled by HALL & PICKLES. Second Edition. London and Manchester: Sherratt & Hughes. 1905.

THE title chosen for this volume may perhaps prove to be a little misleading, for it is not a treatise on steel construction, but an elaborated section book, compiled for the firm mentioned by Messrs. Charles Heathcote & Sons, of Manchester, giving the properties of standard steel sections, and showing their values in different combinations in such a way as to facilitate the work of architects, engineers, and contractors. Part A consists of "Property Tables," in which standard sections of angles, tees, zeds, channels, and joists are catalogued, together with the mathematical properties—practically the same as those published by the Engineering Standards Committee—and with additional information enabling the user to make due allowance for eccentricity of loading in beams and to determine the strength of any section when applied as a strut, under centric or eccentric loads. As the tables are extended to cover built-up girders and stanchions, they constitute a very complete and valuable series. Parts B and C give the safe loads for selected sections of beams and struts, but the loads for other sections can easily be determined by means of the data contained in the property tables. Among the novel features in this book, the most meritorious is the tabulation of reduction factors, relative to shearing stress and eccentric loading upon beams and stanchions, the manner in which these factors are to be used being clearly explained in the preface. An excellent plate at the end of the book shows at a glance the economical values of different stanchion sections, and makes it easy to select sections of given height capable of carrying any given load within the range of the diagram. Another useful plate, showing the shearing strengths of girder webs, enables the user to determine the shear that a given web will resist without the use of stiffeners. The general arrangement of the tables and the features we have indicated should be widely appreciated by architects and structural engineers, and we heartily welcome this volume as a most complete and carefully compiled work of reference. It certainly is the best section book of the kind ever published in this country.

Modern Housing in Town and Country. By JAMES CORNES, member of the Leek (Staffs) Town Council. London: B. T. Batsford. 1905.

IN his preface, Mr. Cornes states that for years the "interesting and fascinating" study of the housing problem has engaged his attention, and, "in response to requests," the results of his studies are now published. In addition to the preface, table of contents, introduction, etc., which run to xviii. pages, there are 196 pages of letterpress and illustrations describing and illustrating houses of various kinds for the "working classes." Four principal types of groups are considered:—1, Block Dwellings and Rowton Houses; 2, Tenements or Cottage Tenements of Two or Three Stories; 3, Cottages and Villages; and 4, Garden Cities. The illustrations constitute the principal feature of the work, and include plans and views of blocks of dwellings erected by public authorities in various parts of the country and of single cottages, pairs, and terraces, erected by private individuals. The cottages erected at the Garden City, Letchworth, furnish material for about one-third of the book. A short but usually adequate description is given in each case, the cost being stated, and in most cases the price per cubic foot. Some of the designs cannot be properly understood as sections are not given; as an example, we may mention the houses erected for the author at Leek, the plans of which do not show how the central bedroom is lighted. The height of the rooms in the tenements at Rotherhithe is said (on page 25) to be 6 ft. 8 in., but surely this is a misprint. Mr. Cornes has compiled a book which cannot fail to prove useful, not only to the members of public bodies, but also to property-owners, architects, and builders, and the publisher has presented the work in an attractive form.

A Practical Treatise upon Warming Buildings by Hot Water. By FREDERICK DYE, M.R.I., author of "Steam Heating," etc. London: E. & F. N. Spon. 1905.

MR. DYE has an intimate knowledge of his subject, and, as he also has the ability to write clearly and methodically, the book before us is both useful and interesting. There are three preliminary chapters on "The Laws of Heat," etc., ten chapters on low-pressure apparatus, and three dealing with drying-rooms, high-pressure apparatus, and warming buildings by heated air. Valuable information, chiefly in tabular form, is given in an appendix, and there is also a good index. The chapters on low-pressure heating occupy about two-thirds of the book, and contain full descriptions of the various parts of the apparatus and of the different systems of piping in common use. Due stress is laid on the necessity for safety valves, and there are many valuable hints for the prevention or rectification of defects in circulation. In the paragraphs on the advantages and disadvantages of the high-pressure system, the disadvantages are not, in our opinion, fully stated, and a chapter might with advantage have been added on some of the more recent developments in heating by hot water. For all ordinary work, however, the book is an excellent guide. It contains 320 pages, and the illustrations (nearly 200 in number) are clear and to the point.

Practical Plumbers' Work. Edited by PAUL N. HASLUCK. London: Cassell & Co. 1905.

This little book of 160 pages is, according to the preface, principally from the pen of Mr.

J. Wright Clarke. It contains 298 illustrations, and a good deal of practical information, but it is not by any means a complete treatise on plumbers' work. Nothing is said about hot-water services, and the index contains no reference to waste-pipes, water-closets, baths, or lavatories; there is, indeed, on page 38, an illustration of a simple sink-waste, together with a short description, and on page 63 there is an illustration of a lead soil-pipe and connexions. The book contains very little information about the design of plumber's work, but deals almost exclusively with details of workmanship. It is clearly written, and will be of use to technical students.

The Rudiments of Practical Mathematics. By A. CONSTERDINE, M.A., and A. EARNES, M.A. London: John Murray. 1905.

AS A very simple treatise dealing with the measurement of length, area, volume, time, and velocity, this book should be found useful to beginners. Arithmetical, algebraic, and geometrical methods of performing calculations are explained so clearly that the most youthful student will be able to follow the meaning of the authors without difficulty. We are not quite certain, however, that the average schoolboy will understand the statement that the course has been arranged on "heuristic lines." Perhaps the term is intended as an incentive to the practice of the method indicated by the somewhat unusual Anglo-Greek adjective here employed.

Journal of the British Fire Prevention Committee. London. 1905.

THIS special issue contains a record of the Commission appointed by the Committee to visit the principal cities of Central Europe on the occasion of the International Fire Service Congress at Buda-Pesth in 1904, and has been compiled by Messrs. Edwin O. Sachs, Horace S. Folker, and Ellis Marsland, who formed part of the Commission. The record is of more interest to fire brigade officers than to architects, although the latter will find some useful notes on theatres and on fire-prevention in buildings.

Proceedings of the Incorporated Association of Municipal and County Engineers. Vol. XXX. – Edited by THOMAS COLE, A.M.Inst.C.E. London: E. & F. N. Spon. 1904.

THIS bulky volume of 674 pages contains reports of the meetings of the Association at Widnes and Runcorn, Aberdeen, Hastings, London, Great Grimsby, Newcastle-on-Tyne, York, Buxton, Newport, and Shrewsbury, and includes papers on tramways, water supply, sewage works, bridges, and other municipal works in these towns, together with a number of folding plates in illustration of the papers. There is not much in the volume of particular interest to architects, but engineers and surveyors will find it both interesting and useful.

Journal of the Royal Sanitary Institute. Vol. XXV., Part III. London: Offices of the R.S.I., Margaret-street. 1904.

NEARLY the whole of this volume of 630 pages is occupied by the papers read at the Congress in Glasgow and by reports of the discussions thereon. There is an interesting paper on "The Construction of Hospitals," by Mr. Alex. Cullen, F.R.I.B.A., and there are also a number of papers on sewage purification. Mr. James Graham, Inspector of Schools to the West Riding County Council, gives "Some Particulars of Adjustable School Furniture," with illustrations, which are, unfortunately, too small and indistinct to be of much use; the paper contains a good deal of information about Continental schools which had been visited by the author.

BOOKS RECEIVED.

REPORT ON BRICKWORK TESTS. Conducted by a sub-committee of the Science Standing Committee of the Royal Institute of British Architects. London: The Royal Institute of British Architects, 9, Conduit-street, W.

MATRICULATION DIRECTORY. No. XLI. September, 1905. Cambridge: Burlington House. London: Red Lion-square, W.C.

Correspondence.

DISTRICT SURVEYORS' FEES.

SIR,—I see that the London County Council contemplate introducing another Building Act next session, and are circularising the various local bodies for suggestions.

Might I be allowed to point out the very inequitable way in which the fees of the district surveyor are calculated under the existing Act? In a small alteration to a large building, or series of buildings if connected, the fees are out of all proportion to the amount of work done. I have known a fee of 7*l.* being claimed for enlarging a window opening! C. J. S.

The Student's Column.

STEAM BOILERS AND PIPES.—XIV.

CHIMNEYS (*continued*).

HITHERTO we have written of theoretical velocity, but it must be remembered that for a given head the actual velocity of the cold air and of the hot gases is very much less than that indicated by formulæ (13) to (23).

Practical Velocity or Draught.—In article XI. we showed that friction in smooth pipes has a very important effect in reducing the flow of air and gases. It will be readily understood that the losses of head and velocity are proportionately higher in the case of chimneys with sooty surfaces, connected with boiler furnaces and flues, presenting still greater resistance to the passage of the air and gases. When the chimneys and flues are of brick the resistance to flow is far more marked.

Formula (5), p. 301, shows that the loss of head in a smooth pipe is governed by the velocity actually prevailing and by the length and diameter of the pipe.

The same laws govern the loss in the case of a flue, where special importance attaches to the resistance offered by contractions, turns, and bends, and by the condition of the interior surfaces, and to the influence of enlargements of area and changes of the cross-sectional form of the flues.

To obtain figures indicating the loss of head and reduction of velocity from these causes in any particular boiler plant would involve a series of intricate calculations, but even then the results could only be regarded as a very rough estimate of the probable loss under one assumed set of conditions.

The theoretical velocity necessarily varies from time to time with the temperature of the gases and prevailing atmospheric conditions, and the friction varies with the cleanliness of the flues and the management of the boiler furnace.

For these reasons it would be mere waste of time to make elaborate mathematical computations of the losses occurring between the inlet and the outlet of the boiler chimney.

Nevertheless, it is very desirable that a clear idea should be obtained as to the extent to which the head, or motive force, is used up in the acts of forcing air into the boiler furnace, which is the inlet at the foot of a chimney, and of driving it through the boiler flues and up the chimney itself.

In his classical work "Traité de la Chaleur," Péclet discusses this subject at considerable length, and gives formulæ for calculating the losses of velocity arising from various causes in boiler furnaces, flues, and chimneys, but in almost every instance he says that the values of the necessary coefficients can only be determined by experience.

The investigations of Daubuisson and others show that the values of the *coefficient of contraction* governing the flow of air through an opening such as the inlet to a boiler furnace are as follows:—

Circular orifice in thin plates..	0·56 to 0·79
Short cylindrical mouthpieces (parallel)	0·81 ,, 0·84
Short cylindrical mouthpieces (rounded).....	0·92 ,, 0·93

Referring to the loss of velocity due to the passage of air between the grate bars and through the layer of fuel, Péclet says that "this determination, by theoretical considerations, is impossible." In practice the loss varies between very wide limits.

Daubuisson states that in his numerous experiments upon curved air conduits he found that seven bends of 45 deg. reduced the velocity of flow by one-fourth. A singular circumstance, however, was that the loss did not appear to increase proportionately with the number of bends. Therefore Daubuisson was unable to establish any general rule applying to this source of loss.

Péclet discusses very fully the losses of velocity due to changes of direction of the gases, enlargements of flues, and the division and subsequent reunion of the gases. Still, he does not give any rules that can be applied without qualification, as general values for the essential factors cannot be assigned with any approach to accuracy.

With regard to the friction of gases in conduits, it should be pointed out that the conditions appear to be somewhat different from those obtaining in the case of liquids flowing in pipes, and that the coefficient of friction for gases depends upon the nature of the material of which the conduit is made, as well as upon the state of its interior surface.

As the result of numerous experiments, Péclet derived the following values for the coefficient of friction (k) over sooty surfaces:—

Earthenware chimneys	0·0127
Iron plate chimneys	0·0050
Cast-iron chimneys	0·0025

The length and sectional area of a chimney, and of the flues in connexion therewith, have also a very marked influence upon the practical velocity of the gases. The total length and mean area can easily be included in a formula, but if the varying dimensions of the conduit were to be taken into account from the inlet to the top of the chimney an interminable number of calculations would have to be performed, and the results would probably not be more reliable than those afforded by the addition of a reasonable allowance to the combined length of the chimney and flues.

This method is, in effect, recommended by Péclet, who says that the actual velocity of discharge from the top of a chimney can be represented by a formula which, in the notation we have adopted hitherto, is

$$V_a = \sqrt{\frac{2g\,h\,d}{d + 2g\,k\,(H + l)}}$$

where h = head, d = diameter, k = coefficient of friction, H = height of chimney, and l = length of flues.

Péclet adds:—"If the flues had a section differing from that of the chimney, and if the air in its movement encountered any resistances whatsoever, this same formula would still represent the velocity of discharge, provided that a suitably determined value be given for l; for every resistance of every kind may be represented by that offered by a duct of given diameter, but of suitable length."

The trouble, however, is to determine what length may be suitable to represent the various sources of resistance in a given boiler plant.

Morin adopts a convenient method of calculating values for the several kinds of resistance, but as his theory incorrectly assumes the theoretical velocity of the heated gases to be proportionate to $\sqrt{\frac{D - d}{d}}$, the factors so obtained have to be doubled so as to render them applicable to formulæ in which the theoretical velocity is correctly shown to be proportionate to $\sqrt{\frac{D - d}{D}\left(\frac{D}{d}\right)}$.

For the purpose of arriving at a simple rule by which the actual velocity (v_a) of the chimney gases may be determined with approximate accuracy, we have adapted the method of Morin so that the results shall be suitable for use with formula (16), p. 346, when the density of the chimney gases is approximately half that of the external air.

Resistance due to contraction at the air inlet to the furnace is represented by the expression $\left(\frac{1}{r} - 1\right)^2$, where r = the coefficient of contraction.

Taking the value of this at 0·60, we have

$$\left(\frac{1}{0{\cdot}60} - 1\right)^2 \times 2 = 0{\cdot}88.$$

Resistance offered by the fire-grate and layer of fuel depends upon the relation of the air spaces in the fuel to the area of the chimney top, and is $\left(\frac{A}{A_1} - 1\right)^2$,

where A = area of the chimney top. A_1 = collective area of air passages through the fuel. In practice the area of these air passages may range from 10 to 60 per cent. of the chimney area.

Taking A_1 at $(0{\cdot}1 + 0{\cdot}6) \div 2 = 0{\cdot}35$, we get

$$\left(\frac{1}{0{\cdot}35} - 1\right)^2 \times 2 = 6{\cdot}9 \text{ (nearly).}$$

In formula (24), below, we have used the sum of the foregoing results as a constant, taking the value at 8 to avoid unnecessary decimals.

Resistance due to bends, enlargements of area, and the splitting and reunion of the draught can be represented with sufficient accuracy by the expression $n\left(\frac{1}{r} - 1\right)^2 \times 2$

Making $r = 0{\cdot}60$ as before, we have

$$n \times 0{\cdot}88,$$

where n = the number of bends and similar causes of resistance or loss.

Friction of the gases over the soot-covered surfaces of square or circular chimneys and flues is given approximately by

$$\left(\frac{2\,S\,f\,(H + l)}{A}\right),$$

where S = surface, f = coefficient of friction, H = height of the chimney, l = length of the flues, and A = mean area of the chimney and flues.

The velocity of discharge is proportional to the sectional area divided by the periphery of a conduit, and, as in circular and square flues and chimneys the surface is always one-fourth of the diameter or side, the term may be written

$$\left(\frac{8\,f\,(H + l)}{d}\right) \times 2.$$

Taking the coefficient of friction at 0·01, we get

$$(8 \times 0{\cdot}01)\left(\frac{H + l}{d}\right) \times 2 = 0{\cdot}16\left(\frac{H + l}{d}\right)$$

Applying the foregoing values to formula (16), we have for the actual velocity of discharge

$$v_a \sqrt{\frac{2g\,H\left(\frac{D - d}{D}\right)}{1 + \left[8 + 0{\cdot}88n + 0{\cdot}16\left(\frac{H + l}{d}\right)\right]}\left(\frac{D}{d}\right)} \quad (24)$$

When the theoretical velocity has already been calculated, or can be found by reference to a table, the actual velocity is found thus:—

$$v_a = v \div \sqrt{1 + \left[8 + 0{\cdot}88n + 0{\cdot}16\frac{(H + l)}{d}\right]} \quad (25)$$

In these formulæ we have made ample allowance for the various causes of loss. Other values can be used to meet special cases, but if the factors be reduced much they will give velocities in excess of those obtained in chimney-shafts working under ordinary conditions.

Practical experience indicates that the actual velocity of the hot gases in boiler chimneys with well-arranged flues, not exceeding in length the height of the chimney, is generally about one-fifth of the theoretical velocity.

Therefore for rough estimates it is convenient to take the value of

$$\left[1 + \left(8 + 0{\cdot}88n + 0{\cdot}16\,\frac{(H + l)}{d}\right)\right] \text{ at } 25.$$

Then we have

$$v_a = \sqrt{\frac{2g\,H\left(\frac{(D - d)}{D}\right)}{25}\left(\frac{D}{d}\right)}$$

which reduces to

$$v_a = 0{\cdot}2\sqrt{2g\,H\left(\frac{D - d}{D}\right)\left(\frac{D}{d}\right)} \quad (26)$$

and

$$v_a = 0{\cdot}2\,v \quad (27)$$

When the temperatures of the hot gases and the external air are 585 deg. and 62 F., respectively, the value of $\sqrt{\frac{D - d}{D}\left(\frac{D}{d}\right)}$ is $\sqrt{0{\cdot}5}\,(2) = 1{\cdot}414$.

Under this condition formula (26) can be further simplified by omission of $\sqrt{\frac{D-d}{D}\left(\frac{D}{d}\right)}$ with a corresponding modification of the factor 0·2 to $(0{\cdot}2 \times 1{\cdot}414) =$ to 0·2828, say 0·28.

Thus

$$v_a = 0{\cdot}28\sqrt{2g\,H},$$

and by reduction we have

$$v_a = 2{\cdot}26\sqrt{H} \quad \ldots\ldots\ldots\ldots (28)$$

The following example shows the application of formulæ (24) and (25):—

Example (10).—Required the practical velocity of the hot gases in a chimney 100 ft. high by 3 ft. diameter at the top, connected with boiler flues having a total length of 100 ft. and an average area equal to 4 ft. diameter, with eight bends, one split draught, and two enlargements of area, these sources of loss being equivalent to 11·5 bends, the temperatures of the external air and of the hot gases being 62 deg. and 585 deg. respectively.

By Table XVIII., the weight per cubic foot of air at 62 deg. is 0·0761 lb., and by formula (6) that of the chimney gases at 585 deg. is 0·03805 lb. Substituting these and the other values in formula (24), we have

$$v_a = \sqrt{\frac{64{\cdot}4\left(100\,\frac{0{\cdot}0761 - 0{\cdot}03805}{0{\cdot}0761}\right)}{1 + \left[8 + (0{\cdot}88 \times 11{\cdot}5) + \left(0{\cdot}16\,\frac{100 + 100}{(3 + 4) \div 2}\right)\right]}\left(\frac{0{\cdot}0761}{0{\cdot}03805}\right)}$$

$$= \sqrt{\frac{64{\cdot}4 \times 100 \times 0{\cdot}5}{1 + [8 + (10{\cdot}12) + (9{\cdot}14)]}}\,(2)$$

$$= \sqrt{\frac{3220}{28{\cdot}26}}\,(2) = \sqrt{114{\cdot}0} \times 2 = 21{\cdot}3 \text{ feet per second.}$$

Substituting in formula (25) the theoretical velocity as given in Table XXII. and the values of the denominator as already found, we have

$$v_a = 113{\cdot}4 \div \sqrt{28{\cdot}26}$$
$$= 21{\cdot}3 \text{ ft. per second, as before.}$$

The first six columns in Table XXIII. have been calculated in a similar manner by formula (24) for chimneys of various heights, with different values of n and $\frac{H + l}{d}$.

For the purpose of comparison, two columns have been added in which the practical velocity has been obtained by formula (27) from Table XXII. and by formula (28) from the height of the chimneys. The figures in the two last columns differ slightly owing to the omission of numerals beyond the second place of decimals in formula (28).

TABLE XXIII.—CALCULATED PRACTICAL VELOCITY OF THE HOT GASES IN CHIMNEYS OF VARIOUS HEIGHTS, WITH BOILER FLUES OF DIFFERENT PROPORTIONS, THE TEMPERATURES OF THE HOT GASES AND EXTERNAL AIR BEING 585 DEG. AND 62 DEG. F. RESPECTIVELY.

Height of Chimney in Feet (H).	Practical Velocity (V_a) in Feet per Second. $V_a = \sqrt{\frac{2g\,H\left(\frac{D-d}{D}\right)}{1 + \left[8 + (0{\cdot}88\,n) + \left(0{\cdot}16\,\frac{n + l}{d}\right)\right]}\left(\frac{D}{d}\right)}$						Practical Velocity (V_a) in Feet per Second.	
	n = 24		n = 12		n = 6			
	$\frac{H + l}{d} = 100$	$\frac{H + l}{d} = 66$	$\frac{H + l}{d} = 66$	$\frac{H + l}{d} = 50$	$\frac{H + l}{d} = 66$	$\frac{H + l}{d} = 50$	$V_a = 0{\cdot}2v$.	$V_a = 2{\cdot}26\sqrt{H}$.
10	5·2	5·6	6·5	6·8	7·1	7·6	7·1	7·1
20	7·4	7·9	9·2	9·6	10·1	10·7	10·1	10·1
30	9·1	9·7	11·3	11·9	12·4	13·1	12·4	12·3
40	10·5	11·2	13·0	13·6	14·3	15·2	14·3	14·2
50	11·8	12·5	14·6	15·3	16·0	17·0	16·0	15·9
60	12·9	13·7	16·0	16·7	17·6	18·6	17·5	17·5
70	13·9	14·8	17·2	18·1	19·0	20·1	18·9	18·9
80	14·9	15·8	18·4	19·4	20·3	21·4	20·2	20·2
90	15·8	16·8	19·6	20·5	21·5	22·8	21·5	21·4
100	16·7	17·7	20·6	21·5	22·7	24·0	22·6	22·6
120	18·3	19·4	22·6	23·8	24·8	26·3	24·8	24·7
140	19·7	21·0	24·4	25·5	26·8	28·4	26·8	26·7
160	21·1	22·4	26·0	27·3	28·7	30·4	28·6	28·5
180	22·4	23·8	27·7	29·0	30·4	32·2	30·4	30·3
200	23·6	25·0	29·2	30·6	32·1	34·0	32·0	31·9

COUNTY DISTRICT OFFICES, FALKIRK.—The new County District offices at Falkirk were opened recently. The building occupies a position in West Bridge-street, and is built in the Italian Renaissance style from plans prepared by Messrs. A. & W. Black, architects, Falkirk.

GENERAL BUILDING NEWS.

ESTABLISHED CHURCH, SCOTSTOUN, N.B.—The memorial-stone of a new Established church was laid at Scotstoun recently. The church is situated at the extreme west end of Scotstoun, at the corner of Dumbarton-road and Victoria Drive. The general plan consists of a nave without any aisles or pillars, a circular apse or chancel, east and west transepts with galleries over them, approached from the nave. The length of the church is 106 ft. by a breadth of 32 ft. at the nave and 68 ft. across the transept. The height to the ridge of the roof is 46 ft. The accommodation is for about 900 people, seated in area and transept galleries. The principal feature of the design is the central lantern tower rising about 70 ft. above the ground, or to the apex of the roof 90 ft. It is 33 ft. square internally and 65 ft. in height, and there are eight double windows in the lantern. The architect is Mr. James Chalmers, Glasgow.

METHODIST CHURCH, WHITLEY BAY.—A new Free Methodist church is shortly to be opened at Whitley Bay. Mr. W. H. Knowles, of Newcastle, is the architect, and Mr. W. A. Styan, of Whitley, the contractor for the building.

BAPTIST CHURCH, WELLINGBOROUGH.—This church was opened on the 28th ult. The buildings are designed in a late period of Gothic, freely treated, and are faced with red bricks with white dressings. The church has a tower and spirelet at the corner, rising to a height of about 70 ft. The accommodation is for 432 adults, or a mixed congregation of over 500 persons. Two vestries, etc., are provided. The contract amount was 2,476*l.*, including boundary walls. Schools are intended to be added in the future. The architects are Messrs. George Baines & Son, Strand, London, W.C., and the builders Messrs. E. Brown & Son, Wellingborough.

WESLEYAN CHURCH AND SCHOOL, GRAVESEND.—The foundation-stones of a new Wesleyan church and school were laid recently at Gravesend. The building is being erected of red pressed facing bricks, with Bath stone dressings, and the tower and spire will rise to a height of about 100 ft. from the ground. The building, which has been designed by Messrs. W. J. Morley & Son, architects, of London and Bradford, will consist of nave, transepts, and choir, with vestries for the minister and for the choir. The organ will be placed in an elevated position at the rear of the choir seats, the latter being in a gallery which rises in the chancel from behind the rostrum. The accommodation will be for 740, 286 being in the gallery, which occupies three sides of the building. The interior woodwork of pews, open waggon-headed roof, etc., will be varnished pitched pine. The rostrum will be of American walnut or mahogany. The tracery and other church windows will be filled with tinted ornamental leaded lights. The entrance vestibule will be laid with Diespeker Venetian marble mosaic. The school premises, fronting into Wilfred-street, comprise an assembly hall 50 ft. by 30 ft., an infants' room, three smaller

classrooms, and a library. There is also a church parlour on the first floor. The contract is in the hands of Mr. A. E. Tong, of Gravesend, and the cost will be about 5,476*l.* The heating is by Mr. A. J. Tait, of Willesden. The premises will be lighted by electricity by Mr. H. Warner, of Gravesend. Mr. W. G. Cooke is acting as clerk of works.

WESLEYAN CHAPEL, CONSTABLE BURTON.—A new Wesleyan chapel has been opened at Constable Burton. Built of stone, and roofed with Westmorland slates, it is 27 ft. long, 18 ft. 6 in. wide, and 15 ft. high; lighted by seven Gothic-headed windows with leaded lights, and a three-light window over the porch. The roof is open. The accommodation is for about 150. The work has been carried out under the direction of Mr. Arthur G. Dalzell, architect, Halifax. Mr. Thomas Handley was the builder.

WESLEYAN CHAPEL, BROCKHOLES, YORKSHIRE.—A new Wesleyan chapel is in course of construction at Brockholes. When completed the chapel is to have a chancel and nave, giving accommodation for 200 persons. The architect is Mr. E. W. Lockwood, Huddersfield. The estimated cost of the land and the erection is 1,714*l.*

SCHOOLS, GILLINGHAM.—The new schools in Napier-road are now completed and in occupation. The buildings are constructed of picked yellow bricks, with red brick quoins to angles, and glazed brown brick dadoes up to sill level. The roofs are tiled. All floors are of wood block on concrete, except the cloakrooms, lavatories, and corridors, which are paved. The walls and ceilings are plastered with "Sirapite" plastering, the lower portion being finished with cement, which is painted, the upper part being distempered. The whole of the joinery is picked pitch-pine, lightly stained and varnished. A bell turret is placed at the south-west angle of the mixed school. Each school has a separate playground, with a south or west aspect, having a natural fall from the schools, and paved with asphalt. Covered play-sheds are provided for use in wet weather. The latrines are placed against the boundary walls. Each classroom has fresh-air inlet shafts and exhaust ventilators at ceiling level, communicating with the roof ventilators. In winter the rooms will be warmed from the boilers in the basements, the fresh air being passed over the radiators. The central halls are ventilated and heated in a similar manner. Electric light is used for lighting the buildings. The girls' school is placed on the ground floor, and accommodates 300 children. Two entrances are provided for seniors and juniors, leading direct into the central hall through short corridors, off which are placed the cloakrooms, which are lighted from the ends, each having a recessed lavatory. The cloakrooms have gangways between the hanging rails, and separate entrance and exit doors, so that the children can enter and leave the schools without confusion. The central hall, 77 ft. by 18 ft., is lighted from both sides and ends. There are six classrooms, all opening into the hall, and lighted from the left-hand side, each being 20 ft. by 25 ft., and accommodating fifty pupils. The teachers' room, which opens direct into the hall, and overlooks the girls' playground, has a lavatory and water-closet. The book-store adjoins, and a lock-up sink is placed off the cloakrooms. The boys' school is on the upper floor over the girls' school. There are two entrances and staircases for juniors and seniors, the accommodation being the same as that in the girls' school, except that the master's room overlooks the boys' playground. The infants' school accommodates 320 children, and has a central hall 50 ft. by 26 ft., lighted from both ends. Opening into this hall are two babies' rooms, each accommodating sixty babies; and four classrooms, each accommodating fifty infants, all lighted from the left-hand side. The entrances are at either end of the hall, each having a large cloakroom and lavatory. The teachers' room, which overlooks the playground, opens direct into the hall, and has a lavatory. The book-store adjoins, and a lock-up sink is provided in the cloakroom. The total expenditure, including playgrounds, but exclusive of desks, will not exceed 9,800*l.* Mr. H. Harris was the contractor for the work, Mr. J. Hatchard Smith being the architect, and Mr. C. H. Langley, of Gillingham, the clerk of works.

COUNCIL SCHOOL, HEREFORD.—The new St. Peter's Council School, in Bath-street, Hereford, was opened on the 22nd ult. It has been planned on the central hall system, and the whole building is of the hipped roof description, the central hall, besides having side windows, being gabled to allow for the proper lighting and ventilating of the classrooms. All the roofs are roofed with brindled Broseley tiles. The sizes of the respective rooms in feet are:—Central hall, 50 by 30; three classrooms, 25 by 25; two classrooms, 29 by 20; two classrooms, 25 by 20. The teachers' rooms are 14 by 10. The flooring of the whole building is of pitch-pine wood blocks, with raised galleries for the back row seats in the classrooms. Granolithic has been used in the paving of the outer porches, etc. The heating chamber is below the assistant masters' room, and was put in by Messrs. John King, Ltd., of Liverpool. The new school has seating accommodation for 400 boys. The walls are formed of a glazed brick brown-tinted dado, above which they are plastered with Adamant plaster. All round the rooms at a convenient height the walls are treated to form a continuous and permanent blackboard. All the classrooms and assembly hall are ceiled to the collars. The walls are coloured with French grey. The lighting of the building will be provided by incandescent light. Provision has been made for cloak and cap room, all the pegs being numbered from one to 200 in both the senior and junior divisions of the school. Compo-board partitions for economy of space have been used here. There are two other rooms—the headmaster's room with an adjoining store-room, and an assistant master's room, together with another storeroom. The desks are of the dual form and of pitch-pine. The brick work is of local fancy bricks, the windows, with mullions, heads and sills, and the string courses being of a biscuit-coloured terra-cotta. There is a playground, tar paved, surrounded on the one side by an unclimbable iron fence, on two other sides by walls, and in front by an ornamental iron railing on a dwarf brick wall. Another addition is an open play shed covered with Broseley tiles. Twyford's latrines have been adopted. Altogether the structure, with its furnishings, will cost about 6,000*l.* Mr. E. W. Wilkes, builder, Hereford, carried out the work from plans prepared by Mr. Noel Barker, architect.

SCHOOL, CROSSNACREEVY, BELFAST.—The O'Neill Memorial School, Crossnacreevy, County Down, has just been opened. The site of the new building occupies an elevated position on the east side of the road from Belfast to Ballygowan. The main schoolroom is 40 ft. long by 25 ft. wide, and the height to the ceiling is 17 ft. The classrooms are 16 ft. long by 13 ft. wide. The lavatory building is 17 ft. long and 9 ft. wide, and in addition to this there are two play-sheds, each 72 ft. long. The ceilings and wainscotting are sheeted in pitch pine and varnished, and the walls plastered smooth and tinted, the angles being rounded to prevent the lodgement of dust. The grates and mantels were supplied by Messrs. Riddels, Ltd.; Mr. Alexander M'Kibbin carried out the plumbing; the lighting is by acetylene gas, and the apparatus and plant for it were supplied by Messrs. The Sunbeam Acetylene Gas Company, Ltd., the plumbing of which was carried out by Messrs. Lowden & Co. The cathedral lead lights for front were supplied by Mr. W. A. Roberts. The contractor for the entire work was Mr. James Kidd, Belfast, who has carried out the work under the supervision of Mr. S. K. Kirker, C.E., Assistant Principal Surveyor, Board of Works.

COUNCIL SCHOOL, SEEDLEY.—A new council school has been erected at Seedley, Salford. Accommodation is provided on three floors for 420 boys, 370 girls, and 380 infants, a total of 1,170 places. Each department is provided with a central hall, around which the classrooms are arranged. The estimated cost of the building was 15,510*l.*, and of the furniture about 1,080*l.* The architect is Mr. Henry Lord, and the contractors Messrs. W. Southern & Sons, of Salford.

WARWICK-ROAD NEW COUNCIL SCHOOLS, WALTHAMSTOW.—These schools were opened on September 16 last by Councillor Lord. The buildings have been erected on a site purchased by the late School Board, and the various departments are arranged as follows:—A two-floor block to accommodate 320 girls on the ground floor and 320 boys on first floor on the 10 sq. ft. basis; a single floor block provides accommodation for 400 infants on the 9 sq. ft. basis, making a total of 1,040. Each department has two entrances. Provision is made for manual instruction for boys; and a laundry centre for girls in separate buildings. A caretaker's house adjoins the main entrance in Warwick-road, and an additional entrance is provided in Chestnut-avenue. The schools are planned on the central hall system with class-rooms grouped around same. Teachers' rooms, large cloakrooms, lavatories, stores, etc., are also provided. The buildings are faced with Adderley Park red pressed bricks with string courses of white bricks, and Portland stone dressings; the whole are designed economically with a view to securing well lighted and ventilated rooms. There are glazed brick dados 4 ft. high throughout, and the walls of staircases are entirely glazed. Above the dados the walls are plastered with cement. The floors and staircases are of fireproof construction, those of halls and class-rooms are covered with pitch-pine blocks, the galleries being sloped instead of stepped. The lighting throughout is by electricity installed by the Council. The ventilation is on the natural system, with air inlets in walls and Boyle's ventilators on roof, and the heating is on the low-pressure system, supplied by Musgrave & Co. Messrs. H. Knight & Son, of Tottenham, carried out the work at the contract price of 16,572*l.*, from the designs prepared by the Committee's architect, Mr. H. Prosser. A feature in the design are the two octagonal turrets rising out of a square base with stone weatherings falling into a side of the octagon at various heights and flanking each end of the two-floor block. Carved stone panels bearing the County arms and the Warwick crest, also panels and caps to buttresses and stone entrances, relieve the red brickwork.

TOWN HALL, WALSALL.—The new town hall and council house at Walsall have just been opened. Mr. J. S. Gibson was the architect for the work, his designs, which were published in our issues for October 6 and 13, 1900, and May 13, 1905, being accepted in competition. The total cost of the scheme has been 101,000*l.*

PROPOSED WORKHOUSE EXTENSION, CLAYTON.—Plans have been prepared by Mr. J. Harper Bakes, Architect to the North Brierley Board of Guardians, in conjunction with Mr. Brook Hitchen, Architect to the Local Government Board, for the enlargement of the Clayton Workhouse. The principal feature of the proposed extensions consists of a new infirmary, which will occupy a site at the rear of the existing infirmary. It will be two stories in height, providing accommodation for 109 patients. The central portion of the building will be devoted to administrative purposes, with a male wing on one side and a female wing on the other. A stone staircase on each side, having a wrought-iron balustrade, will give access to the first floor. The nurses' room in the centre, fitted with glass screens, will command the wards on each side. Next to the nurses' room provision is made for two special maternity wards, each 20 ft. by 12 ft. 6 in. in dimension. Male and female day-rooms will adjoin these wards on the two sides. Two small rooms, each containing one bed, are also arranged for on this floor, with bathrooms and other conveniences attached. Extending from the administrative block are dormitories 63 ft. long and 24 ft. wide, in each of which twenty-one beds will be placed. The arrangements on the ground floor are almost the same on the first floor, except that here two rooms will be constructed of a size sufficient to accommodate three patients each, these occupying corresponding positions to the maternity wards below. Boyle's system of ventilation will be adopted, and the heating of the four infirmary wards will be effected by means of the improved Victoria hospital stoves. The floors of the building will be of Hennebique's patent ferro-concrete. In addition to the new infirmary, a detached building for the temporary accommodation of male patients on admission to the workhouse, and a new mortuary, will be erected. A further two-story dormitory is to be constructed as an extension of the main male block, providing accommodation for thirty-four beds. The whole of the new buildings will be faced with local stone, and the roofs will be covered with dark-blue Westmorland slates, in keeping with the roofs of the existing buildings. The floors throughout will be of pitch-pine wood blocks, except for the corridors and lavatories, where mosaic work will be used. A large chimney will be erected on a vacant site close to the laundry. It will be of octagonal shape 40 yds. high, with a flue 3 ft. in diameter. The estimated expense of the whole of the alterations amounts to 18,857*l.*, but this includes the cost of constructing new farm buildings.

HIPPODROME, MANSFIELD.—Work has just been commenced on a new hippodrome which is to be erected in this town. The building will be substantially of stone, measuring 100 ft. long by 60 ft. wide, and the walls will be 2½ ft. in thickness. It will contain a 40-ft. ring, together with a stage, with proscenium 30 ft. by 28 ft. Accommodation will be provided for 1,000 persons in pit, circle, boxes, promenade, and gallery. A refreshment-room will lead off the promenade. The work has been planned by Mr. E. Bryan Dean, architect, Mansfield, and the cost will be over 3,000*l.*

MUNICIPAL BUILDINGS, SOUTH SHIELDS.—The new South Shields Municipal Buildings, of which illustrations were given in our issue for May 20, 1905, were opened on the 27th ult. The work has been carried out at a cost of 48,000*l.* from plans prepared by Mr. Ernest F. Fetch, architect, whose designs were accepted in competition. The contractors were Messrs. Robert & Sons, of Manchester.

HOSPITAL, MOORCROFT, BILSTON.—The hospital which is being erected at Moorcroft under the direction of the South Staffordshire Joint Small-Pox Hospital Board is now nearing completion. It has been built by Messrs. Cave & Sons, of Wolverhampton, from the designs and specifications of Mr. George Green, the Wolverhampton Borough Engineer. The building contract was let for 8,493*l.* Messrs. Dallow & Son, of Blackheath, are laying out the grounds, and are doing all the work relating to drainage, sewerage, and water supply, at an estimated cost of 2,000*l.* Electric lighting is being installed. Messrs. Dobbs & Co., of Wolverhampton, are planting the grounds.

LIBRARY, MORLEY.—The memorial-stone of the new Free Library at Morley was laid on the

28th ult. The plans have been drawn by Mr. W. E. Putman, the Borough Engineer, and show accommodation on the ground floor for news and magazine room, 48 ft. by 30 ft.; a lending library, 40 ft. by 30 ft., to accommodate about 20,000 volumes; reference library, 25 ft. by 21 ft. 6 in.; ladies' room, 25 ft. by 21 ft. 6 in.; borrowers' space, 19 ft. by 16 ft.; librarian's room and staff-room, all the rooms being 15 ft. in height. On the first floor will be two rooms, one of which will be used to contain objects of local interest, and the other and larger room as a lecture-room or general museum. On the lower ground floor will be a juveniles' room, 48 ft. by 30 ft. and 12 ft. high. The building, which will be fireproof, is being built of Morley stone. The whole of the floors will be laid with wood blocks on concrete bed, and the furniture and fittings on the ground floor will be of oak, whilst the wood in the juveniles' room will be of stained deal.

SANITARY AND ENGINEERING NEWS.

AYR HARBOUR.—The arbiter, Mr. William Melville, C.E., has issued his decision in the reference between Messrs. Kennedy Brothers, contractors, Glasgow, and the Ayr Harbour Trustees, arising out of the contract for the reconstruction of the North Quay wall of Ayr Harbour. Messrs. Kennedy Brothers claimed a sum of 25,797*l.* 11s. 1d., and the Harbour Trust tendered a sum of 19,464*l.* 10s. 8d. in settlement of the claim. The arbiter has found the claimants entitled to 20,441*l.* 10s. 5d., and disallowed their claim for the balance. The Harbour Trust's counterclaim for 1,560*l.* of penalties was disallowed with expenses.

FOREIGN.

SOUTH AFRICA.—The building boom at Bloemfontein is at an end. Prices are cut so fine in the trade that contracts can hardly be obtained, except at unremunerative prices. This recklessness in tendering is accompanied by a decline in work. For a large building about to be commenced in the town the difference between the highest and the lowest tender was about 6,000*l.*——The plans of Messrs. Rogers & Ross, architects, have been accepted for the Wesleyan church, Kimberley, the cost of the building being 9,000*l.*

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Owing to the abolition of the office of Chief Architect to the Transvaal Government, which office was held by Mr. William Bevan, F.R.I.B.A., until quite recently, he has resumed practice in London at 90, Parliament-chambers, Great Smith-street, Westminster, London, S.W.——Mr. W. Curtis Green has removed his offices to 14, Gray's Inn-square, W.C.——Mr. W. H. Seth-Smith has, from June 24 last, admitted into partnership Mr. William Ernest Monro, who has been associated with him in practice for the past fifteen years. The practice will be carried on in future under the style of Messrs. Seth-Smith & Monro.——Mr. Edmund Kirby, of Cook-street, Liverpool, has taken into partnership his two sons, Mr. Francis Joseph and Mr. Edmund Bertram Kirby. The firm will henceforth be known as Edmund Kirby & Sons.

APPOINTMENT.—Mr. A. F. Watson, architect, of Sheffield, has been appointed consulting architect to Northamptonshire County Council Education Committee, and Mr. G. H. Lewin, for nine years works architect of Messrs. Cadbury Bros.' works at Bournville, has been appointed building inspector to the same authority.

MEMORIAL LYCH-GATE, SALHOUSE, NORFOLK.—A lych-gate has been erected at Salhouse in memory of the late Rev. Thomas Francis Boddington, M.A. It is of carved oak, roofed with red tiles, and was designed by Mr. Herbert J. Green, of Norwich, the work being carried out by Mr. R. W. Riches, of Postwick.

DISCOVERIES AT CARSHALTON.—The discovery of an hitherto unknown fortified British village has, according to the *Daily Graphic*, been made near Carshalton. Some months ago, while the foundations of a new hospital for convalescents, to be erected by the Metropolitan Asylums Board, were being dug at Carshalton-on-the-Hill, several objects of early British manufacture were found, which led to the discovery of an earthwork, which had been entirely levelled at some unknown date, and the ground converted into arable land. Recently a portion of the site was excavated for the purpose of ascertaining the history of the settlement, which there is little doubt was the original site of Wallington, the "Waleton," or "walled town," as Wallington is described in Domesday. The area of the "oppidum" appears to have been about four acres, and from the evidence obtained by Messrs. Collyer & Robarts, who undertook the investigation, it appears that the settlement was occupied until about B.C. 50, when it was abandoned, probably owing to the Roman invasion. A large number of objects of the neolithic and bronze age date have been discovered, together with interments, both cremated and uncremated. The pottery found is reported to include some very interesting four-handled vessels, and some perforated tiles, hitherto unknown to collectors here. These are believed to have been used for placing cooking pots upon, thus allowing the heat from the fire to have access. A number of loom weights with spindle whorls were discovered, showing that weaving was carried on, while an amber bead, Gaulish pottery, and a foreign stone implement, indicate trade with the Continent.

BATTERSEA POLYTECHNIC.—The Technical Day College, University, and other courses, and the day School of Art, were opened on the 18th ult.; and all evening classes on Monday, the 25th ult. During the vacation structural alterations have been made in order to provide further accommodation for drawing classes connected with the building trades, and two new drawing offices are now being completed which will accommodate from forty to fifty students each. Additions have been made to the staff of the secondary day schools, in order to meet the large increase in attendance, owing to the number of London County Council junior and probationer scholarship holders resident in the district, whose scholarships are tenable only at secondary schools. Seventy-two girl scholarship holders have been admitted to the girls' school, which, pending the erection of new buildings for both boys and girls, is now being held in temporary premises on North Side, Clapham Common. Both the boys' school at the Polytechnic and the girls' school are practically full, and a large number of girls who applied for admission have had to be refused.

THE PLUMBERS' COMPANY.—At the quarterly court held at the Guildhall on the 29th ult. Mr. W. D. Caröe, M.A., F.S.A. (Architect to the Ecclesiastical Commissioners), was sworn into the office of Master of the Worshipful Company of Plumbers; and Mr. Adrian Pollock (City Remembrancer) and Mr. Charles Hudson, Registered Plumber, into the offices of Warden and Renter Warden respectively, on election for the ensuing year.

SOUTH AFRICAN WAR MEMORIAL, ETON COLLEGE.—For the war memorial in the chapel at Eton three large tapestries have been hung against the east wall. The central piece, above the altar, is the "Adoration" subject by Sir Edward Burne-Jones which formerly was hung on the south wall. It is now flanked on either side by new tapestries, worked in the looms at Merton Abbey, and containing figures of angels after those of the Burne-Jones windows in Salisbury Cathedral. The new tapestries are lengthened with a design of scroll and foliage work carrying shields of the coat-arms of Eton and the Universities. An inscription is as follows:—"Has e Mertonensi textrina imagines militum suorum memores posuerunt Etonenses—MDCCCCIII."

MUNICIPAL TRADING, LEICESTER.—The half-yearly reports of the several departments for supply show net profits of 30,785*l.* 1s. 5d. derived from the gas, 7,584*l.* 5s. 5d. from the water, and 5,967*l.* 6s. 7d. from the electric lighting undertakings of the borough. The net profit in respect of water supply is carried to the special fund of the Derwent Valley scheme for bringing water to Leicester, Derby, Nottingham, and Sheffield; portions of the other profits will be applied in relief of the rates.

ANTIQUARIAN DISCOVERIES AT MELROSE.—Various discoveries have just been made during the excavations at the Roman camp at Newstead, near Melrose. The existence of this camp has been known to antiquaries for many years, but lack of funds hitherto prevented any researches being undertaken. The work has, however, been proceeding for some time, and has resulted in revealing various relics of the Roman occupation. At a depth of 12 ft. a perfectly preserved Roman altar, 4 ft. in height and of square formation, was found. The altar is made of stone, and on the top is a small, circular-ridged indenture. One side is covered by accurately chiselled Roman characters, which are interpreted thus:—"To the great and mighty Jupiter, Carolus, Centurion of the 20th Legion, the valiant and victorious, cheerfully, willingly, and deservedly paid his vow." Proceeding with the sinking, the workmen, on getting to a depth of about 30 ft., struck the top of a stone which, when removed, revealed the top of a well. A little to the south of the well two walls of masonry have been laid bare. These walls, running parallel, are about 4 ft. high and 2 ft. apart, and it is assumed that they enclosed a drain or water-pipe. The excavations are being undertaken under the auspices of the Antiquarian Society of Scotland.—*Times.*

QUEEN VICTORIA MEMORIAL IN YORK MINSTER.—A memorial to Queen Victoria has been unveiled in the Ladye Chapel of York Minster. The memorial, which takes the form of a triptych, represents the scene at Bethlehem when Christ was born. Mr. G. F. Bodley, R.A., is responsible for the designs, and Mr. L. A. Turner, the sculptor, has executed the work. Each of the three panels, carved in Bath stone, is 5 ft. 6 in. high and 3 ft. 3 in. wide, the relief projection from back to front being about 18 in.

THE LONDON BUILDING ACTS.—The General Purposes Committee of Paddington Borough Council reported at the Council meeting on Tuesday that they had considered the London Building Acts Amendment Bill, and were of opinion that a new Building Act for London, codifying the present laws with such amendments as may be deemed desirable therein, should be formulated, but before any such Bill is drafted the whole question should be reported upon by a Royal Commission. The discussion upon the matter was adjourned.

CLERGY AND ARTISTS' ASSOCIATION.—The seventh Exhibition of the Clergy and Artists' Association will be opened on Thursday, October 19, in the Laing Art Gallery, Newcastle-on-Tyne, lent by the authorities. The Exhibition will include painting, sculpture, stained glass, wall decoration, cartoons, embroidery, etc., and will be open for three months. Mr. Reginald Hallward will give an address on art at the opening of the Exhibition.

ARCHITECTS' BENEVOLENT SOCIETY.—In response to the special appeal made on behalf of the Architects' Benevolent Society by its President (Mr. John Belcher, A.R.A.) Mr. Walter Emden has offered to contribute 50*l.* provided nine other gentlemen will give the same amount. The President and Council will be glad to hear from gentlemen willing to support Mr. Emden's offer, as the Society, we are informed, is greatly in need of funds.

CAPITAL AND LABOUR.

THE LONDON BUILDING TRADE.—We have pleasure in stating that a satisfactory agreement, by which all points of difference have been settled, has been come to between the London Master Builders' Association and all the trades except the mill-sawyers and the plasterers, and that in the case of these two trades negotiations are being carried on. Next week we may be able to give further particulars.

Legal.

APPLICATION UNDER THE LANDS CLAUSES AND SETTLED LANDS ACTS.

IN the Vacation Court, on Wednesday, Mr. Justice Bray had before him the case of *ex parte* the Governors of Christ's Hospital and St. Bartholomew's Hospital; and *in re* the Lands Clauses Acts; and *in re* the Settled Lands Acts, on a petition for payment of money out of court.

Mr. Mulligan, K.C., in support of the petition, said it was an application for payment out of court of the sum of 71,460*l.* under the Lands Clauses Acts and the Settled Lands Acts. The money was paid into court by St. Bartholomew's Hospital. Large sums had been paid into court to the credit of Christ's Hospital. An Act of Parliament enabled the Hospital to sell the land, and it was specially mentioned that the money was to be expended in buildings or invested. On a former occasion a sum of 150,000*l.* was paid out of court for purposes for which it was then needed. Since that time another small sum had been paid out of court, and his application was that this sum of 71,460*l.* should be paid to the treasurer of Christ's Hospital on the same terms that the money was paid out in 1902. Counsel had got a certificate from the Board of Education, and as far as he (counsel) could see everything appeared to be in perfect order. His submission was that the Hospital could either expend the money in the erection of buildings or re-invest it as many times as they liked.

Mr. Bowman, representing St. Bartholomew's Hospital, objected to paying the costs of this petition. His clients had already paid for certain re-investments in land, and he submitted that it would be reasonable that they should be dismissed from the proceedings and the amount carried to the account of Christ's Hospital. He understood that some of the money was to be expended in the erection of a girls' school.

In the result, his lordship made an order for the payment out of court of the sum asked for.

OCCUPATION OF UNDERGROUND ROOMS.

ON Tuesday last, at the Kensington Petty Sessions, Mr. W. H. Collbran, "Coombe," Inner Park-road, Wimbledon, answered to three summonses taken out against him by the Kensington Borough Council for unlawfully suffering to be occupied the underground rooms at the premises 1-8, 9-16, and 17-28, Sussex Mansions, Sussex-place, W. The mansions are in three blocks of flats, occupied by tenants, and the underground rooms are occupied by caretakers when

the flats are empty, porters at the service of the tenants at other times.

Mr. Collbran said he built the flats, and the underground rooms had been occupied by porters and caretakers for the last ten years.

The Chairman: "Ten years!"

Much correspondence had been going on lately between Mr. Collbran and the Borough Council, with the result that the Public Health Committee visited the underground rooms, and then directed these proceedings to be taken. The Inspector reported that in the block Nos. 1-8 the ceiling of the underground room was below the level of the pavement, whereas the section of the Act required that it be 3 ft. above. The area in front was closed.

Mr. Collbran at once admitted that the rooms did not comply with the Act, but gave as his defence that the rooms were used in conjunction with those above. "If the flats did not exist," he said, "there would not be rooms underneath."

Mr. Chambers Leete: If that point were good, it would be an answer to the summons. But these rooms form no part of the letting to the tenant, although it is true that with the letting of a suite of rooms defendant agrees to render certain services and gives the services of the porter. The rooms in question, however, are not let to the tenants.

Mr. Collbran: "The porters are servants of the tenants."

Mr. Collbran, in explaining to the Bench, said that before he commenced to build the flats he submitted the plans to the District Surveyor, and no fault was found with them. It would have been easy enough to have remedied any fault before he started to build, but now, although he wished to meet the views of the Council, he found it impossible as he had no more available space, and so his hands were tied. He pointed out that there had never been a case of illness in these rooms, although they had been occupied for so long.

Mr. Leete asked for an adjournment. He said the defendant had written to the Public Health Committee making a certain suggestion, and the letter would be dealt with at the Borough Council meeting.

Adjourned for a fortnight.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

18,980 of 1904.—W. H. DELVE: *Household Fire Grates and the like.*

This relates to a device for use in connexion with household fire grates, the object being to provide a contrivance which, when placed in the back of the grate, shall provide an air heating-chamber whereby hot air may be passed to the room for heating purposes. This device comprises a front plate provided with a suitable number of openings, having its top part preferably curving over and formed with side pieces, so that when placed in position against the back of the grate a more or less enclosed receptacle is formed, having an open bottom, through which air passing through the bars of the grate may enter, and in this chamber the air is heated, and may then pass through the openings in the front for heating the room.

21,743 of 1904.—C. D. HUNTER: *Stair Treads and the like.*

This invention relates to stair treads and the like, and has for its object to make the tread non-slipping. According to the invention the steps, which are made of stone, artificial or otherwise, have grooves conveniently undercut formed in the tread, these grooves being filled with lead or other suitable material. It is preferable to make the grooves parallel to each other and to the edge of the step.

23,570 of 1904.—E. J. OWEN: *Domestic Fire Grates and the like.*

This relates to a device for use in assisting the production of a bright fire, the said device consisting of a casting with a hollow or concave back, a projecting convex front or face tapering from its base to its apex, with a flat, narrow face at the back, forming a flange on its two sides and apex continuously. Open spaces are provided with undercut or bevelled edges at the back, the said back and base being at a suitable angle. The device is placed in a domestic fire grate or the like.

23,762 of 1904.—A. PASS: *Machines for Planing Mitres and the like.*

A machine for planing mitres and the like, consisting in the combination of a base board provided with guide faces, top and bottom guide rails attached to end brackets and to the junction of the guide faces, a plane with grooved sides adapted to reciprocate in the said rails, and means for operating the plane, consisting of a level handle pivoted to the plane and having a toothed sector adapted to engage with a fixed rack.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

1,902 of 1905.—J. WENDLER: *Revolving Doors.*

This relates to a rotating door, the leaves of which, carried by a rotating ceiling and adapted to revolve normally about a common central axis, can each be swung upon a vertical side axis, characterised by the fact that two adjacent leaves consist of two single leaves in order to firstly prevent the leaves from jamming together when the rotating door is opened, and secondly to enable the rotating door to be used also as a swing door, the said two single leaves of the doors being kept locked by arms rotating on pins, entering grooves in the upper edges of the leaves and forming a cross, and which bear at their free ends against a vertical adjustable sleeve, so that by lifting the sleeve all the leaves of the doors can be simultaneously released.

4,951 of 1905.—E. PRESTON: *Machines for Punching Roofing and like Slates.*

This relates to a slate-punching machine having a tubular head having a vertical hole, which hole has a groove at one side terminating in or passing into an inclined slot in the said head, and the combination with the said grooves and slotted tubular head of a plain or cylindrical punch, carrying spindle with projecting pins for engaging with and working in the inclined slot of the tubular head.

7,232 of 1905.—E. H. COX: *Composition for Cleansing and Renovating the Polished or Painted Surfaces of Wood, Stone, or other Materials.*

This relates to a composition for cleansing and renovating the polished or similarly treated surfaces of wood and the like, consisting of 11 per cent. of sulphuric acid, 11 per cent. of salt, 49 per cent. of water, 6 per cent. of glycerine, 22 per cent. of adhesive thickening substance, and 1 per cent. of aromatic volatile oil. In making the composition the salt should be first dissolved in water, then the acid added, and stirred until the solution is thoroughly mixed. The solution is then allowed to stand for a few hours. The adhesive substance, glycerine, and aromatic oil are then added, and the whole thoroughly mixed.

13,545 of 1905.—F. HARRIS: *Fixed or Portable Shelves or Work Boards for use at Potteries and other places.*

This relates to the construction of portable or fixed rectangular, square, or other desired shape of shelves or work boards of various sizes, consisting of a wood framing having a single sheet or piece, or two or more sheets or pieces, of perforated zinc or other like suitable metal screwed against one of its sides to extend from one end to the other end, and from one side edge to the opposite side edge of same.

13,671 of 1905.—G. L. MOUCHEL: *Reinforced Concrete Structures.*

This relates to means for anchoring a metal bar to the concrete in which it is embedded, comprising straps or links adapted to be passed partially round the bar and projecting into the concrete, and secured to the bar by cotter pins passing through a hole or holes in the straps.

24,028 of 1904.—L. WEILANDT: *Boundary Stones or Posts.*

This relates to a boundray stone or post constructed with its foot, or lower part, in the form of a screw, by means of which it can be readily inserted in position by screwing into the ground without having first to dig a large hole for that purpose. The underside of the foot of the boundary stone or post may be formed with a central recess, adapted to receive a small ball of glass, earthenware, or other hard material for the purpose of facilitating the centring of the boundary stone or post and its more convenient adjustment in position.

631 of 1905.—L. B. DAVIS: *Device for Packing or Jointing Tubes or Pipes.*

This relates to means for making a fluid-tight joint between a tube and its plates, in combination with a ferrule, for use with a conical seating, consisting of a cylindrical body bored to fit the tube, a screw thread upon said body, one end of which body is reduced in diameter to a comparatively thin substance, splits or cuts in said thin end, a ductile metal located in said splits, and means for rotating or otherwise thrusting forward the said ferrule.

676 of 1905.—JOHN RUSCOE & CO., LTD., and E. PASS: *Means for Connecting Branch Service Pipes with Mains.*

This relates to a stop-tap ferrule, consisting of a plug screwed for connecting to the main, and internally screw-threaded, terminating in a valve seat, a tube having a gland for a spindle, a screwed union joint connecting the plug and tube together, fluid-tight, a branch formed on the tube to connect to the branch pipe, internal screw threads formed in the tube above the outlet of the branch, a screw valve carried on the valve spindle adapted to screw down on the valve seat in the plug, and up in the screw tube to govern the supply of fluid through the branch, and enable the said branch to be used full bore.

2,357 of 1905.—G. RUHLMANN: *Safety Outlet fo Sewage Pipes and the like.*

This relates to a safety exit for drains and the like, characterised by the arrangement of a shutter provided with adjustable counterpoises and an automatically revolving valve closing an overflow opening, so arranged that as long as the flood water does not rise in height above the level of the overflow threshold the said valve will enable the drain water to flow away freely; but if the flood water in the outlet channel rises above this level, the valve will prevent any flow into the drain by falling down into its closed position, whilst the shutter permits of the discharge of the drain automatically as soon as the conditions allow of it.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

Sept. 20.—By J. DALZIEL (at Dumfries).

Glencairn, Dumfries.—The farms of Craiglearan and Lower Glenjaan, 138 acres, y.r. 360*l.* £7,550

Sept. 23.—By COOKE BROS. (at Llanidloes).

Hengynwyth-Fawr, Montgomery.—"Pen-y Graig Farm," 52 a. 0 r. 16 p., f., y.r. 28*l.* 585

Sept. 25.—By C. RAWLEY CROSS & CO.

Shepherd's Bush.—230, Goldhawk-rd., u.t. 57½ yrs., g.r. 7*l.*, y.r. 65*l.* 700

Acton.—2, Stanley-rd. (laundry), u.t. 61½ yrs., g.r. 10*l.*, y.r. 40*l.* 250

By F. DOD & CO.

Hackney.—71, Amhurst-rd., u.t. 54½ yrs., g.r. 7*l.* 7s., y.r. 42*l.* 550

29, Downs Park-rd., u.t. 60 yrs., g.r. 6*l.* 10s., y.r. 40*l.* 370

By NICHOLAS, DENYER, & CO.

Staplehurst, Kent.—"Medlock" (holding) and 6½ acres, f. 620

By A. SAVILL & SONS.

Kennardington, Kent.—"The Manor Farm Estate," 667 a. 0 r. 29 p., f. (in lots) 5,360

Sept. 26.—By BROWETT & TAYLOR.

Paddington.—29, Lanhill-rd., u.t. 57 yrs., g.r. 6*l.*, y.r. 50*l.* 395

Canning Town.—50, 52, and 54, Wouldham-st., f., w.r. 68*l.* 18s. 340

By LEWIS & SPAIN.

Wood Green.—6 and 10, Selborne-rd., u.t. 78 yrs., g.r. 11*l.*, y.r. 60*l.* 470

By CHARLES MUSKETT.

Hadley, Middlesex.—10 and 11, Cockfosters-rd., u.t. 96 yrs., g.r. 2*l.*, w.r. 49*l.* 8s. 395

New Southgate.—10, St. Paul's-rd., f., w.r. 23*l.* 8s. 250

37, Friern Barnet-rd. (s.), u.t. 48 yrs., g.r. 4*l.*, y.r. 55*l.* 475

Friern Barnet.—1 and 2, Addison-villas, f., y.r. 64*l.* 750

By FREDK. WARMAN.

Canonbury.—30, Clephane-rd., u.t. 42 yrs., g.r. 15*l.*, e.r. 65*l.* 530

Finsbury Park.—24 and 26, Ede-rd., u.t. 71½ yrs., g.r. 18*l.* 18s., y.r. 75*l.* 520

Highgate.—8, Lidyard-rd., f., e.r. 34*l.* 490

11, Lansdown-ter., u.t. 70 yrs., g.r. 5*l.* 10s., w.r. 39*l.* 310

Crouch End.—37, Tivoli-rd., u.t. 76 yrs., g.r. 2*l.*, e.r. 48*l.* 405

Hornsey.—89 to 97 (odd), Campsbourne-rd., u.t. 67 yrs., g.r. 36*l.* 15s., w.r. 140*l.* 8s. .. 560

By NICHOLSON, GREAVES, & CO. (at Sheffield).

Barnby Dun, Yorks.—"Park Hill Estate," 500 a. 0 r. 20 p., f. and c. 16,500

By J. KITTOW & SON (at Launceston).

Egloskerry, Cornwall.—"Treludick Farm," 235 a. 0 r. 19 p., f., y.r. 286*l.* 6,025

North Hill, Cornwall.—"Lynher Farm" and tenement, 184 a. 2 r. 17 p., f., y.r. 194*l.* 4,565

Linkinhorne, Cornwall.—"Ley" and "Pearce's Yolland" farms and "Ley Mill Cottage," 87 a. 2 r. 11 p., f., y.r. 90*l.* 2,825

St. Ives, Cornwall.—"Cargibbett Farm," 65 a. 1 r. 24 p., f., y.r. 30*l.* 935

St. Cleer, Cornwall.—"Nine-tones" (or "Newstones") farm, 83 a. 3 r. 11 p., f., y.r. 42*l.* 10s. 950

Liskeard, Cornwall.—"Woodhill" and "Old Treworgey Farm," 157 a. 3 r. 15 p., f., y.r. 120*l.* 4,125

Sept. 27.—By J. DAVEY & CO.

Old Charlton, Kent.—56, Wellington-rd., u.t. 83 yrs., g.r. 2*l.* 1s. 6d., y.r. 40*l.* 390

By DYER, SON, & HILTON.

Brixton.—414, Brixton-rd. (s), u.t. 20 yrs., g.r. 6*l.*, y.r. 150*l.* 1,800

19, Canterbury-rd., u.t. 56 yrs., g.r. 6*l.* 10s., y.r. 50*l.* 400

By R. & S. SMITH.

King's Cross.—39, 41, and 43, Collier-st., f., e.r. 88*l.* 12s. 620

104 and 110, King's Cross-rd. (s.), u.t. 14½ yrs., g.r. 12*l.*, y.r. 135*l.* 710

By MADDISON, MILES, & MADDISON (at Yarmouth).

Potter Heigham, Norfolk.—"The Bower Farm," 92 acres, f. (in lots) 2,730

Sept. 28.—By C. C. & T. MOORE.

Forest Gate.—20, 22, 24, and 28, Clare-rd., u.t. 71 yrs., g.r. 14*l.*, w.r. 110*l.* 10s. 620

Limehouse.—14, Ackland-st, u.t. 68½ yrs., g.r. 4*l.* 10s., w.r. 44*l.* 4s. 345

By STIMSON & SON.

Shepherd's Bush.—12, Frithville-gdns., u.t. 68½ yrs., g.r. 8*l.*, y.r. 40*l.* 450

Walworth.—40, Faraday-st., u.t. 46 yrs., g.r. 5*l.* 5s., w.r. 53*l.* 0s. 240

192, South-st., u.t. 47 yrs., g.r. 5*l.*, 15s., w.r. 36*l.* 8s. 210

Dulwich.—28 to 34 (even), Landells-rd., u.t. 72½ yrs., g.r. 18*l.*, w.r. 119*l.* 12s. 750

Holloway.—89 and 91, Corbyn-st., u.t. 65 yrs., g.r. 10*l.* 5s., y.r. 60*l.* 12s. 560

81, Thorpedale-rd., u.t. 65 yrs., g.r. 4*l.* 15s., w.r. 39*l.* 265

By RUTTERS'.

Kensington.—13A, Pembridge-pl. (studios), f., y.r. 125*l.* £1,025

By TREMIDDEN & CO.

Dunstable, Beds.—"Westleigh" and 1¼ acres, f., p. 800

By VARLEY & LOCKING.

Leytonstone.—28, Fairlop-rd., f., e.r. 42*l.*..... 563

Clapham.—Larkhall-la., l.g. rents 16*l.*, reversion in 57 yrs. 565

By FOSTER & CRANFIELD (at Eastham).

Eastham, Cheshire.—The Topsy-Turvey Railway (as a going concern) 110

Sept. 29.—By FISHER, STANHOPE, & DRAKE.

Stoke Newington.—61, Manor-rd., u.t. 68 yrs., g.r. 9*l.*, e.r. 50*l.* 505

By HORNBLOWER & FLOWER.

Sutton, Surrey.—Benhill Wood-rd., "Oak Lodge," f. 1,050

By F. VARLEY & SON.

Stoke Newington.—29, Queen Elizabeth's-walk, u.t. 70 yrs., g.r. 7*l.* 10*s.*, e.r. 55*l.* .. 450

By VENTOM, BULL, & COOPER.

Yaxley, Hunts.—The Broadway, a block of freehold land, 15 a. 1 r. 29 p. 650

Hackney.—88, 90, 96 to 106 (even), Pritchard's-rd. (s.), y.r. 403*l.* 16*s.* 4,495

Pritchard's-rd. (rear of), storehouse and premises, also factory, saw mills, etc., f., v.r. 117*l.* 16*s.* 1,300

Wharf-rd., "London Wharf," f., y.r. 100*l.*... 2,000

1 and 1A, Wharf-rd., f., e.r. 90*l.* 1,400

10 to 20 (even), Wharf-rd., f., w.r. 187*l.* 4*s.*. 1,510

Wharf-rd., freehold storehouse, workshops, yard, and stabling, w.r. 164*l.* 18*s.* 1,010

1 to 5, Ada-pl., f., w.r. 137*l.* 16*s.* 900

Ada-pl., l.g. rents 13*l.*, reversion in 5½ yrs.. 900

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns for gardens; yd. for yard; gr. for grove; b.h. for beerhouse; p.h. for public-house; o. for offices; s. for shops; ct. for court.

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples, sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

MEETINGS.

FRIDAY, OCTOBER 6.

Architectural Association.—Annual General Meeting: President's Address and Distribution of Prizes. 7.30 p.m.

Royal Sanitary Institute.—Dr. A. Wellesley Harris on "Elementary Statistics." 7 p.m.

SATURDAY, OCTOBER 7.

Incorporated British Institute of Certified Carpenters.—Mr. H. Adams on "Timber and Brains." 6 p.m.

Sanitary Inspectors' Association (South-Eastern Centre).—Visit to the Garden City, Letchworth.

MONDAY, OCTOBER 9.

Liverpool Architectural Society.—Opening Address by the President, Mr. Philip C. Thicknesse. 6 p.m.

TUESDAY, OCTOBER 10.

Royal Institute of Public Health (Harben Lectures).—Professor Thomas Oliver, M.A., on "Some of the Maladies caused by the Air we Breathe in the Home, the Factory, and the Mine, including a Description of Caisson Disease or Compressed Air Illness," I. 5 p.m.

WEDNESDAY, OCTOBER 11.

Royal Sanitary Institute.—Dr. E. J. Steegmann on "Elementary Physics." I. 7 p.m.

THURSDAY, OCTOBER 12.

Royal Institute of British Architects (Newcastle-on-Tyne Meeting).—Reception by the Mayor and Mayoress of Newcastle at the Barras Bridge Assembly Rooms. 6.30 p.m.

Royal Institute of Public Health.—Harben Lecture, by Professor T. Oliver, II. 5 p.m.

Royal Sanitary Institute.—Dr. E. J. Steegmann on "Elementary Physics," II. 7 p.m.

Institute of Sanitary Engineers.—By permission of the Underground Electric Railways Company of London, Ltd., a visit has been arranged to the Electric Generating Station, Lots-road, Chelsea. 2.30 p.m.

FRIDAY, OCTOBER 13.

Royal Institute of British Architects.—9.30 a.m.: Steamboat excursion on the Tyne, concluding with a visit to Tynemouth Priory. 1.30 p.m.: Luncheon; the Institute will be entertained by the Northern Architectural Association at the Barras Bridge Assembly Rooms. In the afternoon visits to places of interest: The Castle and Black Gate (under the guidance of Mr. J. Oliver Heslop, M.A., F.S.A.), the Cathedral, the Guildhall, the Laing Art Gallery. 7.30 p.m.: The Annual Dinner at the Old Assembly Rooms.

Royal Sanitary Institute.—Dr. E. J. Steegmann on "Elementary Chemistry." 7 p.m.

SATURDAY, OCTOBER 14.

Royal Institute of British Architects.—Visit to Durham Cathedral (under the guidance of Mr. C. Hodgson Fowler, M.A.) and to Hexham Abbey (under the guidance of Mr. C. C. Hodges, F.S.A.). [The Edinburgh Architectural Association will entertain at lunch on Monday, 16th, members who desire to extend their Northern Visit to Edinburgh and inspect the Goodyear Exhibition of Architectural Refinements.]

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks.	1 8 0	per 1000 alongside, in river.
Rough Stocks and Grizzles	1 4 0	" " "
Facing Stocks ...	2 0 0	" " "
Shippers	2 0 0	" " "
Flettons	1 7 0	" at railway depôt.
Red Wire Cuts ...	1 14 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ...	4 2 6	" " "
Do. Bullnose	4 7 6	" " "
Best Stourbridge Fire Bricks.....	4 0 0	" " "
GLAZED BRICKS. Best White and Ivory Glazed Stretchers	12 0 0	" " "
Headers	11 0 0	" " "
Quoins, Bullnose, and Flats.....	16 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers...	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamferred, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers, and Header	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers...	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamferred, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand.....	7 0	per yard, delivered.
Thames Ballast.....	5 9	" "
Best Portland Cement	27 0	per ton, "
Best Ground Blue Lias Lime	20 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime.....12*s.* 0*d.* per yard, delivered.
Stourbridge Fireclay in sacks 27*s.* 0*d.* per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington Depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf...	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf...	2 2½	" "

	s. d.	
Ancaster in blocks	1 10	per ft. cube, deld. rly. depôt.
Beer "	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks...	2 4	" "
Red Corsehill "	2 2	" "
ClosesburnRedFreestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

Scappled random blocks	2 10	" "
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per ft. super. "
6 in. rubbed two sides ditto, ditto	2 6	" "
3 in. sawn two sides slabs (random sizes)	0 11½	" "
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "

HARD YORK—

Scappled random blocks	3 0	per ft. cube, "
6 in. sawn two sides, landings to sizes (under 40 ft. super.)	2 8	per ft. super. "
6 in. rubbed two sides ditto	3 0	" "
3 in. sawn two sides (slabs random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "

STONE (*continued*).

YORK STONE—*Robin Hood Quality* (*continued*).

	s. d.	
Hopton Wood (Hard Bed) in blocks	2 0	per ft. cube. deld. rly. depôt.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. sawn both sides random slabs.....	1 0	" "
" " " 2 in. do.	0 8½	" "

SLATES.

in. in.	£ s. d.	
20 x 10 best blue Bangor	13 2 6	per 1000 of 1200 at r. d
20 x 12 " "	13 17 6	" "
20 x 10 first quality "	13 0 0	" "
20 x 12 " " "	13 15 0	" "
16 x 8 " " "	7 5 0	" "
20 x 10 best blue Portmadoc	12 12 6	" "
16 x 8 " "	6 12 6	" "
20 x 10 best Eureka unfading green	15 17 6	" "
20 x 12 " "	18 7 6	" "
18 x 10 " "	13 5 0	" "
16 x 8 " "	10 5 0	" "
20 x 10 permanent green	11 12 6	" "
18 x 10 " "	9 12 6	" "
16 x 8 " "	6 12 6	" "

TILES.

	s. d.	
Best plain red roofing tiles .	42 0	per 1000 at rly. depôt.
Hip and Valley tiles ...	3 7	per doz. " "
Best Brosely tiles.....	50 0	per 1000 " "
Do. Ornamental tiles	52 6	" " "
Hip and Valley tiles ...	4 0	per doz. " "
Best Ruabon red, brown, or brindled do. (Edwards)	57 6	per 1000 " "
Do. Ornamental do	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire do. (Peakes).....	51 9	per 1000 " "
Do. Ornamental do.....	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles.....	48 0	per 1000 " "
Best Ornamental tiles	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "
Best "Hartshill" brand plain tiles, sand faced.	50 0	per 1000
Do. pressed.....	47 6	" " "
Do. Ornamental do	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 6	" " "

WOOD.

BUILDING WOOD.	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in	13 10 0	15 0 0
Deals: best 3 by 9.....	13 0 0	14 0 0
Battens: best 2½ in. by 7 in. and 3 in., and 3 in. by 7 in. and 8 in.	11 0 0	12 0 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less thn best.
Battens: seconds	0 10 0	" "
2 in. by 4 in. and 2 in. by 6 in....	9 0 0	10 0 0
2 in. by 4½ in. and 2 in. by 5 in....	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"

	At per load of 50 ft.	
Fir timber: best middling Danzig or Memel (average specification)	4 10 0	5 0 0
Seconds	4 0 0	4 10 0
Small timber (8 in. to 10 in.) ...	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 10 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.	At per standard.	
White Sea: first yellow deals, 3 in. by 11 in	24 0 0	25 0 0
3 in. by 9 in.	22 0 0	23 0 0
Battens, 2½ in. and 3 in. by 7 in.	16 10 0	18 0 0
Second yellow deals, 3 in by 11 in.....	18 10 0	20 0 0
" 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	13 10 0	15 0 0
Battens, 2½ in. and 3 in. by 7 in.	11 0 0	12 0 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.....	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 0 0	14 0 0
Do. 3 in. by 9 in.....	12 10 0	14 0 0
Battens.....	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	10 0 0	11 0 0
Pitch-pine: deals.....	16 10 0	20 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	44 0 0	upwards.
Oddments	32 0 0	"
Seconds, regular sizes.....	33 0 0	"
Yellow Pine oddments	23 0 0	"
Kauri Pine—Planks, per ft. cube.	0 3 6	0 5 0
Danzig and Stettin Oak Logs— Large, per ft. cube	0 3 0	0 3 6
Small " "	0 2 6	0 2 9
Wainscot Oak Logs, per ft. cube.	0 5 0	0 5 6

COMPETITION AND CONTRACTS.

(For some Contracts, etc., still open, but not included in this List, see previous issues.)

COMPETITION.

Nature of Work.	By whom Required.	Premiums.	Designs to be Delivered
*MORTUARY, CORONER'S COURT, Etc.	Deptford Borough Council.....	(See advt. in this issue)	No date

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, etc., supplied by	Tenders to be Delivered
Verandah and Alterations to Station, Brixham	Great Western Railway Company..	Engineer, North-road Station, Plymouth	Oct. 10
150 Street Barriers	Cardiff Watch Committee	J. L. Wheatley, Town Clerk, Town Hall, Cardiff	do.
Painting and Repairing Prisoners' Van.....	do.	do.	do.
Engineering Laboratory, Queen's College, Belfast ..	Board of Public Works	Stephens & Sons, 13, Donegall-square, N. Belfast	do.
Heating, Lighting, Water, Queen's College, Belfast	do.	do.	do.
Pumping Machinery at Waterworks Pumping Station	Bedford Corporation	N. Greenshields, Borough Surveyor, Town Hall, Bedford	do.
House, Oakle-street, Glos.	Great Western Railway Co.	Engineer, Gloucester Station	do.
House, Pandy, Mon.	do.	do.	do.
Road Metal	Bedlingtonshire U.D.C.	J. E. Johnston, Surveyor, Bedlington	do.
Tar Macadaming of Wilbraham-road, Chorlton	Manchester Corporation	Surveyor to Withington Committee, Town Hall, West Didsbury	do.
Painting Baths, Markets, etc.	Stafford Corporation	W. Blackshaw, Borough Engineer, Borough Hall, Stafford.....	Oct. 11
Wiring and Installation of Subway, etc.	Leeds Guardians	T. Winn & Sons, Architects, 84, Albion-street, Leeds	do.
Painting, etc., Central Police Court, Pilgrim-street..	Newcastle-on-Tyne, Finance Com...	City Property Surveyor's Office, Town Hall, Newcastle	do.
Paint., etc., Children's Home, Church-rd., Wavertree	Toxteth Park Guardians.....	At the Home	do.
1,000 yds. 3-in. Cast-iron Mains, Alderley Edge	Wilmslow & Alderley Edge Gas Co.	W. Severs, Engineer, Gasworks, Wilmslow	Oct. 12
Pulp Warehouse, etc., Darwen Mill	Darwen Paper Mill Co.	Engineer's Office, Darwen Mill, Darwen	do.
S. Aisle, Chancel Seats, etc., All Souls', Netherton..	.....	H. Foxall, Architect, 15, Lowther-street, Carlisle	do.
600 tons of Blue Guernsey Granite.....	Guildford Town Council	C. G. Mason, C.E., Tuns Gate, Guildford	do.
Mortuary Building at Shalford	Shalford Parish Council	E. J. Luan, Architect, 36, High-street, Guildford	Oct. 13
Sinking a Bore-hole	Saxmundham U.D.C.	P. F. Mackenzie Richards, Engineer, 53, Victoria-st., Westminster	do.
School, Pontney	Norfolk Education Committee	E. J. Teach, A.R.I.B.A., 14, Upper King-street, Norwich	do.
Ironmongery for Repairs, etc.....	Sheffield Education Committee....	J. F. Moss, Secretary	do.
Stone Pier (70 yds.) at Blackness	Blackness Improvement Trust	W. M. Scott, Architect Linlithgow	Oct. 14
Repairing Portion of City Estates.....	Bristol Corporation	Peter Addie, City Valuer, Council House, Bristol	do.
Paving, etc., Ashfield-road, Thornton, Bradford	.....	Council Office, Lower Kipping, Thornton..	Oct. 16
1,500 Lineal yds. of Iron Fencing, Saltley.....	B'ham., Tame, Rea Dist. Drain. Bd.	J. D. Watson, Engineer, Tyburn, near Birmingham	do.
*ROAD MAKING AND PAVING WORKS	Hendon U.D.C.	Council's Engineer, Council Offices, Hendon, N.W.	do.
*SUP. OF SHINGLE & FIXING WOOD FENCING	do.	do.	do.
Taking Down & Rebuilding Farmhouse at Halberton	Mr. R. P. Elworthy.....	W. Barrows, Deepway, Tiverton	do.
Recreation Ground at Bargoed	Gelligaer Parish Council	Parochial Offices, Hengoed	do.
*NEW POST-OFFICE, ENFIELD	Commissioners of H.M. Works, etc.	H.M. Office of Works, Storey's-gate, S.W.	Oct. 17
Suspension Bridge (225-ft. span)	Nottingham Water Committee	Water Engineer, St. Peter's Church-side, Nottingham	do.
Council School, Charles Arthur-street, Nechells....	Birmingham Education Committee	J. A. Palmer, Sec., Education Dep., Edmund-st., Birmingham ..	do.
1,500 tons of Broken Guernsey Granite	Dover Town Council	Town Clerk, Castle Hill House, Dover	do.
250 tons Guernsey Granite Chippings	do.	do.	do.
Revolving Sewage Sprinklers, etc., Lundiane	Barnsley Town Council	J. H. Taylor, Borough Surveyor, Manor House Offices, Barnsley	do.
Lighting of St. John's Market by Arc Lamps.....	Burslem Corporation	A. Brember, Borough Electrical Engineer, Burdem	Oct. 18
Alterations, etc., to Schools, Farthingstone	.....	J. B. Williams, Architect, The Moot Hall, Daventry	Oct. 19
Making-up Streets	Southend Corporation.....	E. J. Elford, Borough Surveyor, Southend-on-Sea.....	do.
Raw and Clear Water Tanks (Contract No. 2)	Lincoln Waterworks Committee....	N. McK. Barron, C.E., Corporation Offices, Lincoln	do.
Cast-iron Pipes and Castings (Contract No. 3)	do.	do.	do.
Steam Road Roller, Road Sleeping-Van, & Water Cart	Londonderry County Council	Surveyor, County Court House, Londonderry	do.
Private Street Works at Park, etc., Avenues	Barking Town U.D.C.	C. F. Dawson, Surveyor, Public Offices, Barking	Oct. 23
1,000 tons of Bull-head Steel Rails	Dublin, Wicklow, Wexford Rly. Co.	M. F. Keogh, Sec., Westland-row Station, Dublin	Oct. 25
650 tons of Bull-head Cast-iron Chairs	do.	do.	do.
15,000 Rectangular Sleepers.....	do.	do.	do.
*UNDERGRD. CONVEN., WATERLOO-RD., S.E.	Lambeth Borough Council	Council's Engineer, 346, Kennington-road, S.E.....	Oct. 25
Enlargement of Claydon School Buildings	E. Suffolk County Education Com.	G. W. Leighton, Architect, Prince's-street, Ipswich	Oct. 30
Sewers, etc.	Wembley U.D.C.	C. R. W. Chapman, Surveyor, Public Offices, Wembley	Nov. 1
Storm-water Shed, Stratton St. Margaret.....	Highworth R.D.C.	Beesley, Son, & Nichols, Engrs., 11, Victoria-st., Westminster, S.W.	Nov. 8
Road Material.....	Sheerness U.D.C.	Vincent H. Stallon, Council Offices, Trinity-road, Sheerness	Nov. 11
Rep., Paddocks, Blink Bonny Farm, Norton, Malton	.....	Major Roberts, Westow, Kirkham Abbey, York	No date.
Stallion's Box	.....	do.	do.
Wesleyan Chapel and Schools, etc., Penarth	.....	H. Budgen, F.R.I.B.A., 95, St. Mary-street, Cardiff	do.
Detached Scarifier	Darlington R.D.C.	J. Robinson, Surveyor, Union Offices, Darlington	do.
*NEW INFIRMARY & WORKHOUSE, SLOUGH	Eton Union	C. Smith & Son, Architects, 164, Friar-street, Reading.....	do.

Those marked with an asterisk (*) are advertised in this number. *Competition*, iv. *Contracts*, iv. vi. viii. x. *Public Appointments*, xix.

WOOD (*continued*).

JOINERS' WOOD (*continued*)—	At per standard. £ s. d.	£ s. d.
Dry Wainscot Oak, per ft. sup. as inch	0 0 8	0 0 9
½ in. do. do.	0 0 7	—
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch ...	0 0 9	0 1 0
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 6
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	22 0 0
American Whitewood Planks, per ft. cube.....	0 4 0	0 5 0
Prepared Flooring, etc.—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 0 0
1 in. by 7 in. white, planed and shot	0 12 0	0 14 6
1 in. by 7 in. white, planed and matched	0 12 6	0 15 0
1¼ in. by 7 in. white, planed and matched	0 15 0	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0 11 0	0 13 6
1 in. by 7 in. do. do.	0 14 0	0 16 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 12 9	0 15 0

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 0 0
Compound Girders, ordinary sections	7 15 0	8 15 0
Steel Compound Stancheons ...	9 7 6	10 17 6
Angles, Tees and Channels, ordinary sections	7 15 0	8 15 0
Flitch Plates	8 0 0	8 10 0
Cast Iron Columns and Stanchions including ordinary patterns	6 17 6	8 0 0

METALS. Per ton, in London.

IRON—	£ s. d.	£ s. d.
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality.....	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 0 0	—
Mild Steel Bars.....	8 10 0	9 0 0
Hoop Iron, basis price	9 0 0	9 5 0
" " Galvanized	16 15 0	—
("And upwards, according to size and gauge.)		
Sheet Iron, Black—		
Ordinary sizes to 20 g.	9 5 0	—
" " 24 g.	10 5 0	—
" " 26 g.	12 0 0	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g.....	13 0 0	—
Ordinary sizes to 22 g. and 24 g.	13 10 0	—
" " 26 g.	14 10 0	—

METALS (*continued*).

	Per ton, in London. £ s. d.	£ s. d.
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0	—
" " 22 g. and 24 g.	16 10 0	—
" " 26 g.	18 0 0	—
Galvanised Corrugated Sheets—		
Ordinary sizes 6 ft. to 8 ft. 20 g.	13 0 0	—
" " 22 g. and 24 g.	13 10 0	—
" " 26 g.	14 5 0	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 5 0	—
Best Soft Steel Sheets, 22 g. & 24 g.	12 5 0	—
" " " 26 g.....	14 0 0	—
Cut nails, 3 in. to 6 in.....	9 5 0	9 15 0
(Under 3 in., usual trade extras.)		

LEAD, &c. Per ton, in London.

	£ s. d.	£ s. d.
LEAD—Sheet, English, 3lb. and up	17 0 0	—
Pipe in coils	17 10 0	—
Soil pipe	20 0 0	—
Compo pipe.....	20 0 0	—
ZINC—Sheet—		
Vieille Montagne .....ton	30 15 0	—
Silesian.....	30 10 0	—
COPPER—		
Strong Sheet.....per lb.	0 0 11	—
Thin " ..... "	0 1 0	—
Copper nails ..... "	0 0 11	—

LEAD, &c. (continued)—	Per ton, in London. £ s. d.	£ s. d.
Brass— Strong Sheet	0 0 10 ...	—
Thin „	0 0 11 ...	—
Tin—English Ingots	0 1 5½ ...	—
Solder—Plumbers'	0 0 7 ...	—
Tinmen's	0 0 8½ ...	—
Blowpipe	0 0 1½ ...	—

ENGLISH SHEET GLASS IN CRATES.	
15 oz. thirds	2½d. per ft. delivered.
„ fourths	2¼d. „ „
21 oz. thirds	3¾d. „ „
„ fourths	3½d. „ „
26 oz. thirds	4¼d. „ „
„ fourths	3¾d. „ „
32 oz. thirds	5¼d. „ „
„ fourths	5d. „ „
Fluted Sheet, 15 oz.	3¼d. „ „
„ 21 oz.	4¼d. „ „
½ Hartley's Rolled Plate	2d. „ „
⅜ „ „ „ „	2¼d. „ „
½ „ „ „ „	2½d. „ „

OILS, &c.		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 1 6
„ „ „ in barrels	„	0 1 7
„ „ „ in drums	„	0 1 9
Boiled „ „ in pipes	„	0 1 8
„ „ „ in barrels	„	0 1 9
„ „ „ in drums	„	0 1 11
Turpentine, in barrels	„	0 4 2
„ in drums	„	0 4 4
Genuine Ground English White Lead	per ton	19 15 0
Red Lead, Dry	„	19 5 0
Best Linseed Oil Putty	per cwt.	0 6 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, etc., 26s. per annum.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

CARLISLE.—For constructing a storage reservoir, etc., on the Castle Carrock Beck, for the Corporation. Messrs. J. Mansergh & Sons, engineers, 5, Victoria-street, Westminster, S.W.:—

J. Watt	£91,920	Fisher & Le Fanu§	£66,783
Morrison & Mason, Ltd.	87,497	R. C. Crawford	65,975
W. Kennedy, Ltd.	82,855	J. Young, Ltd.	65,578
J. Scott	79,833	G. Mackay & Son	64,919
R. Firth & Co†	77,359	R. H. B. Neal, Ltd.	64,232
Baldry & Yerburgh§	73,039	H. Arnold & Sons, Doncaster*‖	61,733
G. H. Bushby	71,066	W. Hill & Co.¶	54,980
H. M. Nowell‡	69,724	W. Moss & Sons	54,638

‡ Schedules not priced. § Qualified as to puddle.
‖ Qualified as to use of quarry.
* Qualified as to stone and sand.

CROYDON.—For pulling down part of "Andover House," South End, Croydon, for Mr. W. Cheesman. Mr. W. C. Poole, architect, Prested-road, Clapham Junction, S.W. Quantities by Mr. E. C. Poole, 61, High-street, Southampton:—

T. Pearce	£3,430 0 0	....	Mar. 23, 1905
Nick & Co.	3,396 3 0	....	Mar. 16, 1905
E. Wallis	3,323 5 5	....	Jan. 1, 1905
J. & C. Bowyer	3,275 0 0	....	Ap. 30, 1905
F. Webster	3,274 0 0	....	Mar. 31, 1905
W. H. Baldwin	3,209 9 0	....	not stated
C. Marriott	3,200 0 0	....	Feb. 28, 1905
F. & G. Foster	3 146 0 0	....	6 months
Turtle & Appleton	3,135 0 0	....	Dec. 25, 1905
H. Bacon & Son	3,097 0 0	....	7 months
W. Smith & Sons	3,085 0 0	....	Mar. 25, 1906
R. R. Nightingale	3,081 0 0	....	not stated
W. H. Hyde	3,046 0 0	....	7½ months
R. Page & Son	2,999 0 0	....	Mar. 31, 1906
G. Wales & Co.	2,975 10 0	....	Feb. 1, 1906
Harris & Co.	2,975 0 0	....	6 months
J. Barker & Co., Kensington*	2,950 0 0	....	Dec. 10, 1905
Gutheridge Bros.	2,950 0 0	....	4 months

[* Accepted subject to revision.]

CASTLEBAY (Island of Barra).—For 6,000 yds. of pipe track and laying 50 tons of pipes. Mr. J. Wedderspoon, Engineer, The Castle, Inverness. Quantities by the engineer:—

Ross	£3,842 14 8	Allan Bros.	£1,003 17 7
Gregory & Co.	1,569 17 0	E. & D. Stewart	992 16 1
Cameron	1,525 15 0	F. Urquhart	985 6 0
Ross & Mackenzie	1,353 17 8	W. Bain	977 5 7
McVinish	1,185 11 1	Anderson & Nisbet	955 8 4
Adam & Co.	1,088 0 0	Fletcher, Lobermery*	954 6 9
Mactavish	1,021 3 3	Buchanan	951 0 0
Macdonald	1,008 13 8		

DARTFORD.—For extension of Eynsford sewer, for the Rural District Council. Mr. W. Harston, engineer, 8, Hythe-street, Dartford:—

Wisbey & Co.	£349 9 3	H. C. Godfrey & Co.	£168 0 0
W. Shuter	274 0 0	S. W. Gibson & Co.	166 16 0
J. Jackson	191 6 2	Road Company	149 17 9
Friday & Ling	190 0 0	W. H. Wheeler	143 10 0
Rayner	184 0 0		
W. F. Bisy	180 0 0		

FRINTON-ON-SEA (Essex).—For a pair of villas to be built on the Queen's-road. Mr. R. Mawhood, architect, Chelmsford:—

Baker & Sons	£1,270	F. Cracknell, Chelmsford*	£1,200
Potter & Son	1,245		

GRAYS THURROCK.—For macadam, etc., for the Urban District Council. Mr. Arthur C. James, Surveyor to the Council:—

Macadam.

	Per ton. s. d.
The Penles and St. Ives Stone Quarries, Penzance*	10 9
The London Basalt Stone Co., London*	9 8

[Nineteen other tenders received.]

Extension of Electric Lighting Station.

J. Brown	£565 0 0	H. Philtry	£488 5 6
J. L. Lawrence	525 19 0	H. R. Carter, Grays*	485 0 0
G. Brown	510 10 0		

GREAT YARMOUTH.—For the erection of additions to Messrs. Arnold's premises, Regent and King streets. Quantities by architects. Messrs. Olley & Saward, architects, Great Yarmouth:—

Main Contract.

C. Wiseman	£4,710 17 6	I. S. Cooper	£4,191 12 0
R. Rastoe	4,547 0 0	G. W. Beech	4,082 0 0
A. Davy	4,412 0 0	Moore & Sons	4,040 0 0
J. Leggett	4,367 0 0	F. Grimble	3,995 0 0
G. T. Flaxman	4,329 0 0	J. D. Harman*	3,983 0 0
Carter & Wright	4,198 0 0		

Shop Front, etc.

I. S. Cooper*	£1,690

HEYSHAM.—For erecting Council offices, caretaker's house, stabling, etc., for the Urban District Council. Mr. H. Miller, Surveyor, Council offices, Heysham:—

All Trades.

R. Kitchen	£2,715 2 7
J. Hatch & Sons	2,500 0 0
W. Parkinson	2,432 10 11
D. Hinchcliffe & Co.	2,394 5 6
J. H. Brear	2,248 15 3½
R. Thompson	2,248 9 9
J. Edmondson & Co.	2,224 17 10
S. H. Cross & Co., Ltd.	2,189 10 10
J. S. Jackson	2,138 15 0
Bakes & Overend	2,093 4 3

Excavator, Mason, Bricklayer, and Drainer's Work.

R. Haworth	£1,498 6 9
R. Kitchen	1,451 0 11
W. Parkinson	1,418 0 0
R. L. Dilworth	1,413 3 4
J. Hatch & Sons	1,391 0 0
J. L. Tyson	1,381 14 7
W. W. Stoneham	1,372 5 3
D. Hinchcliffe & Co.	1,335 6 2
R. Thompson	1,253 18 9
Gillard & Martin	1,213 12 2
J. H. Brear	1,213 12 2
J. Totty	1,170 0 0
Bakes & Overend	1,160 0 0
J. Edmondson & Co.	1,155 1 10
S. H. Cross & Co., Ltd.	1,135 10 6
J. S. Jackson, Heysham*	1,134 10 6

Carpenter and Joiner.

R. Kitchen	£608 6 2	J. H. Brear	£475 12 0½
J. W. Simpson	577 6 10	D. Hinchcliffe & Co.	472 0 4
J. Hatch & Sons	527 0 0	R. Thompson	457 0 0
J. Deacon	500 0 0	S. H. Cross & Co., Ltd.	443 10 0
J. Richardson	493 15 5	Bakes & Overend, Heysham*	443 10 9
J. Edmondson & Co.	486 9 8	J. S. Jackson	443 10 0
W. Parkinson	480 0 0		

Slater.

R. Kitchen	£170 1 2	D. Hinchcliffe & Co.	£146 14 3
J. Hatch & Sons	147 0 0	J. S. Jackson	146 14 3
W. J. Cross	146 14 3	Hill & Nelson	139 10 0
J. H. Brear	146 14 3	J. Edmondson & Co.	138 10 3
Bakes & Overend	146 14 3	W. Parkinson	129 16 5
S. H. Cross & Co., Ltd.	146 14 3	R. Hall & Son, Lancaster*	129 18 5
		R. Thompson	129 16 0

Plumber and Glazier.

D. Hinchcliffe & Co.	£189 8 0	J. Bolton	£167 7 11
R. Kitchen	181 11 0	Calvert & Heald	164 12 0
W. Parkinson	173 5 6	S. Wright	163 0 0
W. Abbott	174 6 10	S. H. Cross & Co., Ltd., Heysham*	162 0 0
R. Thompson	172 6 0	Bakes & Overend	162 0 0
A. Higginbotham & Sons	171 12 1	J. Hatch & Sons	162 0 0
J. Edmondson & Co.	170 2 9	J. S. Jackson	162 0 0
J. Cookson	170 0 0	J. H. Brear	161 15 1
R. D. Taylor & Son	169 5 7	Rushton & Pinch	160 8 2
P. Calvert	167 12 1		

Plasterer and Concretor.

R. Kitchen	£243 6 10	J. Hatch & Sons	£216 0 0
J. Edmondson & Co.	220 10 2	J. Laycock	215 9 0
W. J. Cross	216 1 9	R. Hall & Son	184 19 0
J. H. Brear	216 1 9	W. Parkinson	184 19 0
D. Hinchcliffe & Co.	216 1 9	R. Thompson	184 19 0
J. S. Jackson	216 1 9	Bakes & Overend, Heysham*	141 0 0
S. H. Cross & Co., Ltd.	216 1 9		

Painter.

J. Brash, & R. Heslop	£65 17 0½	J. S. Jackson	£35 18 6
R. Kitchen	60 16 6	S. H. Cross & Co., Ltd.	35 14 4
J. Hatch & Sons	57 0 0	Bakes & Overend	35 0 0
J. Edmondson & Co.	53 14 2	J. H. Frear	35 0 0
R. Thompson	50 10 0	L. Steele	35 0 0
W. Parkinson	46 10 0	D. Hinchcliffe & Co.	35 0 0
J. W. Bland	42 3 2	A. Greenwood, Morecambe*	35 0 0
W. Townson	40 15 0		
A. Higginbotham & Sons	40 5 2		

HULL.—For heating by high pressure school buildings in Villa-place, for the Education Committee of the Corporation. Mr. J. H. Hirst, City Architect, Town Hall, Hull:—

W. Harrison & Co.	£824 17 4½	Jackson & Co.	£295 0 0
King & Co., Ltd., Hull*	367 0 0	W. G. Padgett	291 0 0
		Shean & Wells	219 0 0

ISLEWORTH.—For additions to workhouse and infirmary at Isleworth, for the Brentford Guardians. Mr. W. H. Ward, architect, Paradise-street, Birmingham:—

H. Lovatt, Ltd.	£43,975 0 0
Kaness Bros.	43,836 0 0
Wisdom Bros.	43,675 0 0
H. Knight & Son	43,523 0 0
F. Gough & Co.	43,000 0 0
T. J. Hawkins & Co.	42,943 18 3
T. J. Mesom & Sons	42,575 0 0
J. Barker & Co., Ltd.	42,466 0 0
W. H. Sorden & Son	42,168 0 0
H. Wilcock & Co.	41,987 13 0
W. Harvey-Gibbs	41,740 0 0
W. Pattinson & Sons, Ltd.	41,571 0 0
C. Gray	40,624 10 0
J. Dorey & Co.	40,552 0 0
E. Wall	40,300 0 0
G. Songden & Son	39,993 9 8
C. Wall, Ltd., Upcerne-road, Chelsea*	39,595 0 0

KNARESBOROUGH.—For laying-out and providing a cattle market, for the Urban District Council. Mr. F. Cartlidge, Surveyor:—

Concreting, Mason, Bricklaying, etc.

W. Bentley, Scottar, Knaresborough	£1,039 15 4

Ironwork.

Russell & Son, Leicester	251 15 6
Other trades	124 17 8

LONDON.—For alterations, etc., and forming new Russian restaurant at 399 and 400, Strand, for Romano's, Ltd. Mr. A. Cole, architect, 34, Thurlestone-road, West Norwood, S.E.:—

General Building Works.

J. Peattie	£1,727	A. J. & C. Hocking*	£1,008
Creaton & Co.	1,220		

Decorative Joinery.

McKenzie & Co.	£312	Fire Prevention Building Co.*	£178
Hewetsons, Ltd.	233	L. T. Allen	125

Electric Lighting.

A. Collins, A.M.I.C.E.*	£183	T. Hyde & Co.	£163

Cooking Apparatus.

T. Cubain, Paris*	£193

LONDON.—For making-up and paving northern portion of Lauderdale-road and contingent works, for the Paddington Borough Council. Mr. E. B. B. Newton, Council's Surveyor, Town Hall, Paddington, W. Quantities by Borough Surveyor:—

Martin, Wells, & Co., Ltd.	£1,050 0 0
J. Shelbourne & Co.	1,004 4 9
E. Rogers & Co.	993 0 0
W. Neave & Son	949 0 0
H. Boyer*	859 0 0

LYDNEY (Gloucestershire).—For erecting an elementary school, for the County Education Committee. Mr. M. H. Medland, County Architect, 15, Clarence-street, Gloucester. Quantities by Messrs. Vale & Kingsford, George-street, Gloucester:—

J. Gurney	£3,531 0	H. Woolley & Son	£3,031 0
W. Jones	3,453 0	A. J. Colborne	2,910 12
T. Griffiths	3,385 0	Orchard & Peer	2,880 10
H. Smith	3,321 0	J. Byard & Sons, Stroud-road, Gloucester*	2,819 0
A. Estcourt & Sons	3 232 0		
J. Perkins & Son	3,225 0		
Jerrett & Fisher	3,180 0		

NORTHFIELD (near Birmingham).—For painting, paperhanging, etc., at Shenley Field's Cottage Homes, for the Guardians of the King's Norton Union:—

A. Bromley, 80, Durham-road, Sparkhill	£125

PLYMOUTH.—For alterations and additions to 18, Tavistock-road, Plymouth. Messrs. Carder & Carder, architects, 9, Princess-square, Plymouth:—

Pearce Bros.	£597 0 0	A. C. Jones, Devonport*	£559 8 4
G. R. Turpin	595 0 0		
F. Truscott	570 0 0		

RICKMANSWORTH.—For the reconstruction of Scots Hill Bridge, for the Hertfordshire County Council. Mr. U. A. Smith, County Surveyor, Hatfield:—

Perry & Co.	£959 0 0	G. & J. Davis	£861 5 3
C. Forbes & Co.	831 8 11	A. T. Catley	595 4 0
Muirhead, Greig, & Mathews	780 17 0	G. Darlington	561 2 1
J. Jackson	708 9 4	J. H. Vickers	544 15 2
Clifford & Gough	697 16 8	Clark Bros.	537 12 5
G. Darvill	674 14 10	G. Bell	518 3 8
Thomas & Thomas	672 10 4	W. & C. French	499 12 0
		Wilkinson Bros., London*	491 12 0
		A. E. Rigby	417 12 7

RICHMOND (Surrey).—For erecting a public elementary school in Darell-road, for the Town Council. Mr. E. J. Milner Allen, architect, 74, Ladbroke-gardens, W. Quantities by Messrs. Pinks & Watson, Parliament Mansions, Victoria-street, Westminster, S.W.:—

—	—	Extra for Glazed Brick Dados.	Extra for tar-paving Play Ground.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
W. Gibson & Co.	11,454 0 0	434 0 0	244 0 0	12,132 0 0
Marriott & Salter	10,922 0 0	478 16 4	329 10 10	11,830 7 2
F. G. Lawrence	11,109 15 8	332 0 0	329 10 10	11,771 6 6
W. Wallis	11,022 0 0	427 0 0	300 0 0	11,749 0 0
J. & C. Bowyer	10,697 0 0	545 0 0	299 0 0	11,541 0 0
W. H. Hyde	10,630 0 0	604 0 0	149 0 0	11,483 0 0
R. Elvy	10,544 0 0	533 2 4	300 0 0	11,377 2 4
J. W. Brooking	10,471 0 0	455 0 0	254 0 0	11,180 0 0
Specchley & Smith	10,430 0 0	420 0 0	300 0 0	11,150 0 0
J. & M. Patrick	10,375 0 0	412 0 0	269 0 0	11,056 0 0
Higgs & Outhwaite	10,350 0 0	545 0 0	135 0 0	11,030 0 0
W. Johnson & Co., Ltd.	10,345 0 0	378 0 0	189 0 0	10,902 0 0
W. J. Renshaw	10,279 0 0	400 0 0	225 0 0	10,854 0 0
McC. E. Fitt	9,762 0 0	427 0 0	445 0 0	10,634 0 0
W. Smith & Sons	9,628 0 0	496 0 0	215 0 0	10,339 0 0
A. N. Soole & Son, Richmond*	9 850 0 0	420 0 0	230 0 0	10,300 0 0
G. H. Gibson	9 335 0 0	442 0 0	337 0 0	10,114 0 0

BALTASH.—For supply of stones and gravel, for the Urban District Council. Mr. W. W. Harvey, Surveyor, Baltash:—

	Stones per Ton.	Gravel per Ton.
	s. d.	s. d.
Hoare & Son, Trevollard,	4 6	2 3
St. Stephens-by-Saltash	....	

BOYLAND.—For 4,000 yds. super of concrete and bitumen sheeting, for the completion of Blackhouse reservoir, for the Urban District Council. Messrs. R. Horsfall & Son, engineers, Commercial-street, Halifax. Quantities by engineers:—

G. M. Callender & Co., Ltd., Victoria-street, Westminster*	£2,269 3

UXBRIDGE.—For square brick water tower, for the Urban District Council. Mr. F. S. Courtney, engineer, 25, Victoria-street, S.W.:—

W. J. Taylor & Co.	£2,024 12 0
J. Riley	1,817 2 1
S. Wood	1,708 4 11
W. H. Randall & Son	1,600 15 6
Pethick Bros.	1,595 0 0
Davies, Ball, & Co.	1,586 0 0
A. E. Nunn	1,547 15 6
F. Deacon & Son	1,546 0 0
A. E. Rigby	1,525 0 0
J. & W. Drake	1,501 11 0
J. Ward & Son	1,472 0 0
H. E. Willis	1,462 9 5
A. H. Ball & Co.	1,442 17 7
Smith & Co.	1,394 13 2
J. W. Dean, Ltd.	1,356 5 4
G. Chesswas	1,310 0 0
Chambers Bros.	1,270 0 0
C. H. Hunt & Son	1,247 0 0
G. H. Gibson	1,223 0 0
Radford & Greaves, Derby*	1,068 1 0
[Circular Steel Water Tank.	
Somervail & Co.	2,632 10 6
The Barrowfield Ironworks, Ltd.	2,343 0 0
S. Wood	2,146 18 3
The Wheesoe Foundry Co., Ltd.	2,107 0 0
Newton, Chambers, & Co., Ltd.	2,092 18 0
W. R. Renshaw & Co., Ltd.	2,065 0 0
Westwood & Wrights	2,029 10 0
Smith & Co.	1,975 10 0
T. Davies, Ltd.	1,950 14 11
Hewitt & Kellett	1,893 0 0
T. Watson, jun.	1,857 0 0
G. H. Hughes	1,804 9 6
A. H. Ball & Co.	1,776 1 6
T. Piggott & Co.	1,775 0 0
Davies, Ball, & Co.	1,751 0 0
Biggs, Wall, & Co.	1,713 13 10
A. E. Rigby	1,707 0 0
A. E. Nunn	1,693 7 9
Pethick Bros.	1,662 0 0
Ashmore, Benson, Pease, & Co., Ltd.	1,640 8 0
J. Riley	1,638 17 9
J. W. Dean, Ltd.	1,584 10 0
G. Sands & Son, Nottingham*	1,488 3 0
J. Fraser & Son, Ltd.‡	986 0 0
J. Musgrave & Sons, Ltd.‡	890 0 0
R. Dempster & Sons‡	836 10 0

[‡ Informal.]

STARBECK.—For erecting a gardener's cottage at the Crossways, for Mr. W. Johnson. Messrs. Adkin & Hill, architects, 10, 11, and 12, Prudential-buildings, Bradford:—

Mason: C. A. Nettleton, Bilton, Harrogate*	£148 0 0
Joiners: Clapham & Taylor, 4, Mowbray-square, Harrogate*	78 0 0
Plumber: G. Thompson, Harrogate*	46 0 0
Slater: W. H. Temple, Holmdale, Harkston-road, Knaresborough*	32 9 0
Plasterers: Coleman Bros., Knaresborough*	19 0 0
Painters: Lythe & Clarkson, Back Cheltenham, Mount Harrogate*	5 4 0

STEVENAGE.—For roadworks from Fisher's Green-road to Bromes-green, for Stevenage Urban District Council. Mr. John Gillespie, Surveyor:—

Wilkinson Bros.	£3,069 16 9	H. Foster	£2,360 0 0
G. Bell	2,875 15 7	W. & C. French	2,110 0 0
Fry Bros.	2,715 15 6	H. Williams	2,100 0 0
T. Free & Sons	2,635 0 0	S. Redhouse & Sons	2,017 0 0
T. Adams	2,589 0 0	J. Jackson	1,831 13 2
T. Watson Jun.	2,506 0 0	O. T. Gibbons	1,666 0 0
E. T. Bloomfield	2,546 19 11	H. Arnold & Son, Doncaster*	1,608 0 0
C. W. Killingbach & Co.	2,377 0 0		

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